HORTICULTURAL ABSTRACTS

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Initialled abstracts and reviews not by Bureau staff are by A. H. M. Kirby and S. C. Pearce of the East Malling Research Station, D. Stankovič of Belgrade University, G. St.C. Feilden, G. M. Roseveare and H. Wormald.

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N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

MISCELLANEOUS.

General.

(*See also* 4509.)

3253. GEISENDORF, A. L.
Vade-mecum des principales organisations internationales tenant compte spécialement de leurs rapports avec l'agriculture et des organisations agricoles internationales et institutions internationales apparentées à l'agriculture. **(Guide to the principal international organizations with special reference to their connection with agriculture, and to international agricultural organizations and institutions.)**
Publ. C.E.A.,* 1951, Vol. 5, pp. 125, bibl. 9.

For each of the organizations listed, information is given on the address, history, aims and publications, internal organization, and members or member countries. An alphabetical list of abbreviations of titles is appended.

3254. TUBBS, F. R.
East Malling Research Station.
Proc. roy. Soc., Ser. B, 1951, **139**: 1-18, bibl. 66, illus.

The Director of East Malling Research Station briefly reviews the development and work of the station since its establishment in 1913, indicating what has been achieved and some of the problems that are still awaiting solution.

3255. WELLENSIEK, S. J.
Taak en functie van het Laboratorium voor Tuinbouwplantenteelt. **(Purpose and function of the Horticultural Laboratory at the Agricultural University.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1952, **15**: 55-61, being *Publ. Lab. Tuinbouwpl, Wageningen.* **103**.

This article outlines the work of the horticultural laboratory of the Agricultural University at Wageningen, Holland, with reference to the genetics and physiology of plants; at present it is confined to apple, tomato, cyclamen and rhododendron, but shortly it is to be extended to pear and soft fruits.

3256. INSTITUTE FOR RESEARCH IN AGRICULTURAL ECONOMICS, OXFORD.
Economics of horticulture. Papers presented to short course, September 1951.
[*Publ.*] *Inst. Res. agric. Econ. Oxford*, 1952, pp. 85.

The following papers are presented: *Horticultural*

* European Confederation of Agriculture, Brugg, Aargau, Switzerland.

statistics by P. G. Ellis, in which an account is given of the methods used and the problems involved in compiling horticultural statistics of areas under fruit and vegetables, yields and production, and prices. *Market crops on general farms* by H. W. B. Luxton, dealing with the economic problems of mixed farms and the possible economic effects of introducing market garden crops. *The economic aspects of glasshouse crop production* by L. G. Bennet, dealt with under the headings (i) economic characteristics of the special physical conditions of glasshouse production; (ii) economic characteristics of glasshouse crops; (iii) economic consequences of changes in acreage; (iv) related subjects for and methods of research. *Investigations in production economics on hard-fruit farms* by K. T. Wright, in which the special economic problems of a top fruit farm are indicated and suggestions are made on how the problems might be studied. *Calculations in the economy of long-term investments* by D. K. Britton. *Horticultural costs* by E. B. Fekete. *Some economic aspects of horticultural marketing* by R. R. W. Folley.

3257. (Brett, —., and Voisenat, —.)
Appellations scientifiques des plantes cultivées et des plantes adventices, leurs correspondance en langues anglaise et française. **(The scientific and common names of cultivated and wild plants in French and English.)**
Rev. hort. Algér., 1952, **56**: 63-77.
A list of scientific, and English and French popular names of 88 cultivated plants and 248 weeds, compiled by Mr. Brett of the Official Seed Station at Cambridge and M. Voisenat, director of the Central Seed Testing Station at Paris.

3258. Melville, R.
Co-existence of positive and negative heterosis in a single plant organ.
Nature, 1952, **169**: 1054-5, bibl. 3.
A comparative study of leaf shape in certain F_1 hybrids of flowering *Ribes* spp. enabled the author to formulate a theory of heterosis which may throw some light on the general problem of hybrid vigour.—Royal Botanic Gardens, Kew.

3259. Mapson, L. W.
Factors in distribution affecting the quality and nutritive value of foodstuffs. Loss of nutrients during the transport and distribution of fruits and vegetables.
Chem. Ind. Lond., 1952, No. 2, pp. 25-8, bibl. 16.
Very little works appears to have been done on the loss of nutrients in fruits and vegetables during transport and distribution, and most of this has been confined to determining the loss of one particular nutrient, vitamin C. From the data presented on such crops as cauliflower, cabbage, spinach, beans, peas, gooseberries, and black currants it is concluded that, if reasonable precautions are taken to protect produce during transit and distribution from excessive temperatures and mechanical injury and the time involved is not too prolonged, the factors inducing a loss of nutrients will be unimportant compared with others that determine nutritive value, such as the particular variety and its stage of maturity at harvest.—D.S.I.R., Cambridge Univ.

3260. Czech, M., and Nothdurft, W.
Untersuchungen über Schädigungen landwirtschaftlicher und gärtnerischer Kulturpflanzen durch Chlor-, Nitrose- und Schwefeldioxydgase. **(Studies on damage caused to agricultural and horticultural plants by chlorine-, nitrosylsulphuric acid- and sulphur dioxide-gases.)**
Landw. Forsch., 1952, **4**: 1-36, illus.
The damage caused by the gases to cultivated plants, including early potatoes, beans, lettuce and ornamental pot plants is described and illustrated by colour photographs.

Statistical design.

(*See also* 3351 l, 4241, 4432.)

3261. Ferrari, T. J.
Growth factors and soil productivity. Results of a multifactanalysis.
Trans. 4th int. Congr. Soil Sci., Amsterdam, 1950, Vol. I, pp. 348-52.
The method is to select plots having a wide range of factors that might be expected to affect cropping in order to find out which of them do in fact show a relationship. In this investigation the potato variety, Bevelander, was studied on 230 plots in the Bommelerwaard district of Holland in respect of pH of soil, its content of P and K, amount of organic matter, clay content and its gley symptoms, height of water table and its degree of fluctuation with time and also distance of the plot from the farm-house, this last being introduced as a measure of the attention it probably received. No modern statistical method was used, but it was clear that crop depended largely on the potash content of the soil and to some extent on other factors. S.C.P.

3262. Bielka, R.
Über die Rand- und Nachbarwirkung, den Einfluss der Fehlstellen und die Mindestteilstückgrösse bei Gemüsefeldversuchen. **(Edge effects and the effects of neighbouring plants, the influence of missing plants and minimum plot size in vegetable field trials.)**
From abstr. in *Kühn-Arch.*, 1952, **64**: 415-16.
The following are among the results of work carried out at the Institut für Obst- u. Gemüsebau, Halle University: (1) A method has been developed which allows the statistical analysis of yields to be based on quality grades in place of weight. (2) In variety trials with 8 vegetables the edge effect had to be taken into account only with lettuce, whereas it was marked in manurial and spacing trials—in the latter case only if analysis was based on weight. (3) The effect of neighbouring plants was less pronounced than the edge effect. (4) Plots for brassicas and leeks were largest, reaching 12×12 m., but were less for other vegetables. The cabbage family required 50-60 plants per plot, celeriac 50 and lettuce 30. The trials were carried out with 5 replications. (5) No conclusive results were obtained in the trials concerning the influence of missing plants.

3263. SAMPFORD, M. R.
Studies in the principles of phytotoxicity. II. Experimental designs and techniques of statistical analysis for the assessment of toxicity.
J. exp. Bot., 1952, **3**: 28-46, bibl. 18.

Some of the more important statistical methods used in the analysis of experiments concerned with studies of phytotoxicity are described, and are illustrated by data from field and laboratory experiments undertaken within the Department of Agriculture of the University of Oxford. Most attention has been given to a consideration of quantal effects, such as the proportionate mortality. Adjustments to allow for natural mortality or the appearance of additional plants during the course of the experiment are outlined, together with the conditions under which the data should be transformed before analysis. Since the relationship between the proportionate response and some function of the dose or concentration of the toxicant generally follows a normal sigmoid law, the methods of probit analysis are appropriate for precise estimations. In this connexion, the design of experiments is discussed and the calculations involved in such an analysis are illustrated. In investigations where quantitative measurements are recorded, the dose-response relationship may also be of the normal sigmoid form, so that the data can be treated by a modification of the probit technique. The methods of statistical treatment demanded when the dose-response relationship does not conform to a normal sigmoid are briefly discussed. [Author's summary.]

Meteorology.

3264. DAVIES, D. A.
Artificial stimulation of rain at Kongwa.
Nature, 1952, **169**: 1001-2, bibl. 2.

For an earlier communication on the artificial stimulation of rainfall at Kongwa, Tanganyika, *see Ibidem*, 1951, 167: 614 (*H.A.*, 19: 3227). A second series of experiments on cloud-seeding is at present being conducted which involves the use of hydrogen-filled balloons both in the original and in a modified form. The latter is based on the theory that hygroscopic particles (90% sea salt; 10% calcium chloride) might be successful in inducing rainfall from well-developed cumulus clouds which have not reached the freezing level. As much of the rain in the tropics falls from such clouds, the new method may have a wider application than the use of silver iodide, which only becomes effective as a seeding-agent at temperatures several degrees below freezing. The salt mixture is conveyed into the clouds by means of balloons and is dispersed by explosion. In these trials, which will cover a period of 4 months, a three-day cycle is being followed with the silver iodide method on the first day, the hygroscopic method on the second day and no experiments on the third day. In addition, the point of release of each balloon is adjusted to ensure that the seeding agent is always released over the same point, the centre of the Kongwa area of cultivation. The experiments are being carried out by the Overseas Food Corporation in collaboration with the East African Meteorological Department.

3265. LAWRENCE, E. N.
Frost investigation.
Met. Mag., 1952, **81**: 65-74.

The investigation is concerned with the incidence and severity of air frosts in the fruit-growing areas in the Fens and in the Lower Severn basin. The period covers the months of April and May for the years 1921-50, and an attempt is made to consider both radiation and wind frosts. A formula is given for the frost frequency over flat clay country. [From author's summary.]

3266. CHASSANY, J.
Les gelées de printemps et la période dite " lune rousse ". (Spring frosts and the period called " red moon ".)
Pomol. franç., 1952, **79**: 27-32.

This is an account of observations made at Lyons during the " April moon " period, with notes on what is meant by this term by various authors. Temperatures recorded are shown in a graph for 1 March to 31 May from 1881 to 1949, and data are tabulated for the " red moon " of Angot, Sanson, and Klein respectively. The evidence does not support the belief that frosts occur more frequently when the moon is " red ".

3267. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.
Air temperature measurements outdoors.
N.I.A.E. tech. Memo. **TM. No. 28/HOR/1036/Div. 1,** [undated, received 1952], pp. 21, bibl. 5, illus.

An examination has been made of some readings of air temperature taken during a series of experiments on measuring the effect of various frost-prevention devices. Preliminary readings with very sensitive thermocouples were highly variable and in order to measure the mean temperature over a short period of time the sensitivity of these instruments was reduced. An account of the behaviour of the different thermometers is given, together with the results of measurements made on the effectiveness of oil heaters using samples of one of the types of thermometer. The difference in response rates leads to differences in indicated temperatures when the radiation heat loss is balanced by a convective heat gain and it is shown that the temperatures indicated by these thermometers during a radiation frost are 2° F. approximately below the temperature of the surrounding air. [Author's abstract.]

3268. WEGER, N.
Beiträge zur Frage der Beeinflussung des Bestandsklimas und der Pflanzenentwicklung durch Spaliermauern und Bodenbedeckung. **(The influence of espalier walls and soil covering on micro-climate, soil climate and plant development.)**
Ber. dtsch. Wetterdienst. U.S. Zone **28**, 1951, pp. 29, bibl. 17.

The chief aim of this agrometeorological investigation, carried out at Geisenheim from 1938 to 1950, was to determine whether plant development could be influenced at will by changing the intensity and spectral composition of sunlight reflected from espalier walls and soil coverings. (1) With peaches a black espalier wall increased wood growth by 31% above that of a

white wall and by 23% above that of a naturally coloured wall, but wood maturity was adversely affected. By contrast, a white wall favoured fruit formation, increasing the number of fruit buds formed per metre of shoot length by 75% and 23% as compared with black and naturally coloured walls respectively. Hence, espalier peaches should be grown on white walls. (2) With vine the different wall colours did not have any definite effect on wood growth, but wood maturity was clearly enhanced by white. In a small-scale trial grapes grown on a white wall had the highest sugar content. (3) With glasshouse bush tomatoes a 1-cm. layer of white sand increased yields by 23% above those of plants grown in a naturally coloured dark soil. Out of doors, in an unfavourable, rainy season, a cover of aluminium foil had the effect of increasing yields by 15%. As the soil cover had hardly any influence on air or soil temperature, the increase must be ascribed to the greater intensity (200% from light sand, 360% from aluminium foil) and spectrally more favourable composition of the reflection, higher soil moisture being an additional factor. (4) With dwarf beans and cucumbers grown in the open yields were not favourably influenced by light-coloured soil covers. (5) Besides white sand and aluminium the following soil covers were studied: Peat, sawdust, coal dust, slate and glass fibre mats. Their effects on soil properties and plant growth are recorded and discussed.

3269. RIDER, N. E.
The effect of a hedge on the flow of air.
Quart. J. roy. met. Soc. 1952, **78**: 97-101, bibl. 2.

Experiments are described in which the horizontal wind speed at 3 heights up to 2 m. was measured at various distances up and down wind from a dense hawthorn hedge 1·68 m. high on occasions with wind directions approximately normal to the hedge. The results show that the hedge began to exert an influence on the wind speed at 2 m. at a distance equivalent to approximately 15 hedge heights upwind, and that downwind its influence extended to a distance approximately equivalent to 60 hedge heights. At the 2 lower heights of wind-speed measurement the range over which the hedge had an effect was smaller. [From author's summary.]

3270. WEST. G.
Wind recorder for microclimatology.
Reprinted from *Electronics*, 1952, pp. 3, bibl. 4, illus.

A portable, sensitive wind recorder system designed for the analysis of local wind-flow patterns is described and illustrated. It consists of 3 units, a wind-speed transducer or anemometer, a wind-direction transducer or wind vane, and a translator unit, which drives standard recording milliammeters of the spring-actuated type.

3271. VINCENT, R. S.
Apparatus for the determination of moisture in samples of air.
J. sci. Instrum., 1952, **29**: 155-7, illus.

In the method described [which seems to have possible applications in horticultural research], a sample of air, 85 c.c. or more in volume, is taken into an evacuated flask which is subsequently connected to the measuring apparatus and the water vapour pressure measured manometrically by absorption in phosphorus pentoxide. The success of the method depends on freezing the moisture temporarily on the inner surface of the flask, thus permitting almost complete separation of the air from the moisture to be measured. Preliminary results under various sampling conditions have given very consistent results.

Biochemistry.

(*See also* 3351e, 4433, 4434, 4434, 4515, 4564b.)

3272. SNYDER, J. Q.
The use of the Beckman Flame Spectrophotometer in plant and soil analysis.
Proc. Okla. Acad. Sci. 1950, 1951, **31**: 134-6, bibl. 8.

A method of routine soil and plant analysis involving the use of the Beckman Flame Spectrophotometer is described. The soils are leached with neutral 1 N. ammonium acetate and the leachate analysed with this instrument. The plant samples are ashed with nitric and perchloric acids and the digest, diluted if necessary, analysed in the same way. Concentrations are determined from standard curves with corrections applied for interfering ions. [Author's summary.]

3273. CASPERSSON, T.
Some recent developments in ultramicrospectrography.
Genet. Iber., 1950, **2**: 277-86, illus. [received 1952].

Recent developments in the use of ultramicrospectrography in quantitative cytochemical work in Sweden are described.

3274. DAVIDSON, J.
The micro-determination of magnesium in plant materials with 8-hydroxyquinoline.
Analyst, 1952, **77**: 263-8, bibl. 19.

Magnesium is precipitated as the oxinate, which is then determined in acid solution by measuring the absorption at 358 mμ with a spectrophotometer. Amounts of Mg from 20 to 200 μg in 1 to 4 ml. of solution can be estimated with an accuracy of ±1 μg. Recovery of Mg added to various plant materials and ash solutions ranged from 98·8 to 100·4 per cent. [From author's abstract.]—Rowett Res. Inst., Aberdeen.

3275. DEBNEY, E. W.
The polarographic determination of phosphate.
J. exp. Bot., 1952, **3**: 47-51, bibl. 3.

A method is described for estimating polarographically the amount of phosphate in small volumes of liquid, where the phosphorus content lies between 0·5 and 10·5 μg. P/ml. with an error of ±0·2 μg. P/ml. even when chloride, nitrate, and sulphate are present in excess. The method is based on precipitation of uranyl phosphate from uranyl acetate and estimation of the uranyl ion left in solution. A comparison is made with the colorimetric method of Berenblum and Chain. The method is considered adequate for study of the

absorption of substances from relatively pure aqueous sprays by leaves.—Edinburgh and E. Scotland Coll. Agric.

3276. THOMPSON, J. F.
The analysis of the alcohol-insoluble nitrogen of plants by quantitative procedures based on paper chromatography. I. The analysis of certain pure proteins.
THOMPSON, J. F., AND STEWARD, F. C.
Idem. II. The composition of the alcohol-soluble and insoluble fractions of the potato tuber.
J. exp. Bot., 1952, **3**: 170-87, bibl. 35.

Part I. From determinations of the amino-acid composition of egg albumin, zein, edestin, cucumber (*Cucumis*) seed globulin and squash (*Cucurbita*) seed globulin by a quantitative paper chromatographic method it is concluded that this method is applicable to the quantitative amino-acid analysis of the protein-N fraction of plants as well as to the analysis of pure proteins. *Part II.* "The analysis of the alcohol-soluble and insoluble fractions (hydrolysate) of potato tubers of the variety 'Sebago' has been carried out. Attention is drawn to differences which exist between the samples and varieties which have been investigated, namely 'King Edward', 'Sebago', and 'Katahdin'. These differences relate particularly to the relative proportion of soluble to insoluble nitrogen, to the amount of amides present in the soluble fraction, and to the ratio of asparagine to glutamine. There is no correlation between the relative proportions of amino-acids as they exist free in the tuber and as they occur in the alcohol-insoluble (protein) fraction. Certain compounds (e.g. γ-aminobutyric acid) are present free in the tissue, but they do not occur in the protein. Also the amides far exceed their possible occurrence combined in the protein. Proline especially is much more abundant in the combined than in the free state, and the ratios between the various free amino-acids are quite different from those which apply to the protein. The latter data suggest that the soluble compounds which occur free are not directly combined as such to form protein. The utility of the quantitative procedure based on partition chromatography on paper in the analysis of the alcohol-insoluble (protein) fraction of plants is, therefore, established."—Cornell University, Ithaca, N.Y.

3277. BIDWELL, R. G. S., KROTKOV, G., AND REED, G. B.
Paper chromatography of sugars in plants.
Canad. J. Bot., 1952, **30**: 292-305, bibl. 11.

A chromatographic technique for qualitative and rough quantitative estimation of sugars and phosphates in plants is described. The soluble sugars and phosphates in 27 families of Spermatophyta have been examined. Sucrose was the predominant sugar in most plants and glucose was higher than fructose in slightly over half. Free pentoses and soluble fructosides were found in a few plants. The distribution of sugars and phosphates varied within groups and families, with the exception that succulents were consistent in having low total sugars and relatively high fructose contents. [From authors' summary.]—Queen's University, Kingston, Ont.

3278. ZACHARIUS, R. M., THOMPSON, J. F., AND STEWARD, F. C.
The detection, isolation and identification of (−)-pipecolic acid as a constituent of plants.
J. Amer. chem. Soc., 1952, **74**: 2949, bibl. 2.

The acid was first detected in green beans, then shown to be a prominent constituent of leguminous fruits and seeds and finally found to be present in many other plants, including potato tubers and edible mushrooms. —Cornell Univ. and Univ. of Rochester, N. York.

3279. HANSL, N., AND WAYGOOD, E. R.
Kinetic studies of plant decarboxylases and carbonic anhydrase.
Canad. J. Bot., 1952, **30**: 306-17, bibl. 10.

Spinach leaf carbonic anhydrase has been used as a tool in the Krebs-Roughton technique to determine whether several plant decarboxylase systems give rise to carbon dioxide or bicarbonate as the primary end product. The results show that in addition to the urease—urea and yeast carboxylase—pyruvic systems, the plant enzyme systems decarboxylating pyruvic, oxalacetic, glutamic, and α-ketoglutaric acids produce carbon dioxide and not bicarbonate as the primary end product. [Authors' abstract.]—McGill University, Montreal.

Physiology.

(*See also* 3350b, d, f, k, u, y, 3351d, f, 4139, 4140, 4153, 4156, 4157, 4194, 4323, 4356, 4515.)

3280. CARR, D. J.
The photoperiodic behaviour of short-day plants.
Physiol. Plant., 1952, **5**: 70-84, bibl. 24.

The short-day plants *Perilla ocymoides* and *Xanthium pennsylvanicum* were subjected to photoperiodic cycles of 48 hours duration, each consisting of an 8, 10, or 12 hour photoperiod, followed by a long dark period. Light breaks were interpolated at various intervals during the long dark periods. Flowering was inhibited by a light break near the beginning or end but not near the middle of the long dark period. The results are compared with those of Claes and Lang on *Hyoscyamus niger*, a long-day plant, and are discussed in terms of various theories of photoperiodism. The experimental data are shown to support Bünning's theory, but not that of Gregory. They may also be explained, as Claes and Lang suggest, if a light break can act in conjunction with a subsequent photoperiod. [Author's summary.]—Manchester Univ.

3281. SCHWABE, W. W.
Effects of photoperiodic treatment on stomatal movement.
Nature, 1952, **169**: 1053-4, bibl. 6.

In experiments with *Chrysanthemum* marked differences in stomatal movement were found between plants subjected to short day cycles (8 hr. full daylight, 16 hr. darkness) and others receiving long day cycles (8 hr. full daylight, 8½ hr. low intensity artificial light, 7½ hr. darkness). These differences were in the main confined to the dark period. At the end of the dark period, the stomata of plants given long day cycles were almost completely closed, while in the short day lots considerable opening had taken place. Rapid closure took place in both treatments at the end of the period of full light. In the plants receiving short day cycles,

however, night opening began after some hours and progressed until the end of the dark period. Similar behaviour has been found in *Kalanchoë blossfeldiana*. Such differences in stomatal behaviour may be important in explaining photoperiodic phenomena.—Imp. Coll. Sci. Tech., London.

3282. WILLIAMS, W. T.
Studies in stomatal behaviour. II. The role of starch in the light response of stomata. Part 3. Quantitative relationships in *Pelargonium*.
J. exp. Bot., 1952, **3**: 110-27, bibl. 18.

The relationship between starch-content and aperture in the stomata of *Pelargonium* has been investigated by a quantitative technique. Heath's suggestion of an inherent diurnal rhythm in starch-content is confirmed, and the light effect which has been the subject of previous contradictory reports is found to be dependent on external humidity. When humidity is high, light (which in these experiments is confounded with reduced CO_2-content) causes a striking reduction in stomatal starch; when humidity is low, light has no effect on starch, but its effect on aperture is unchanged. No evidence for any dependence of aperture on carbohydrate status was obtained, and it is suggested that the function of carbohydrate changes in stomata is, as earlier suggested by Kisselew, the amplifying and stabilizing of changes primarily controlled by other factors. [Author's summary.]

3283. MOSS, R. A., AND LOOMIS, W. E.
Absorption spectra of leaves. I. The visible spectrum.
Plant Physiol., 1952, **27**: 370-91, bibl. 21, being *J. Pap. Ia agric. Exp. Stat.* **J-2017**.

Absorption and reflection spectra for leaves of four dicot species [bean, spinach, Swiss chard and tobacco] possessed certain features in common. There was an absorption maximum in the red at 680 mμ and a minimum in the green at 550 mμ, with points of inflection suggestive of minor absorption bands at about 600 and 640 mμ. Absorption was high throughout the blue but no distinct peak was present. Curves obtained for *Ficus* show the reduced reflection, increased absorption and general flattening characteristic of the absorption and reflection spectra of thick leaves. The white, tomentose, lower surface of a white poplar leaf resulted in an increase in reflection of about 15% and a corresponding decrease in absorption throughout the spectrum when the light was incident on the lower surface. Yellow, orange and red leaves showed about the same reflection in the blue but a much higher reflection in the red, as compared with a green leaf. The yellow and orange leaves reflected much more of the green and yellow light than did the green leaf. Transmission and reflection spectra for yellow leaves were similar, and both were complementary to the absorption spectrum. Dipping leaves in boiling water or in ether for a few minutes shifted their absorption spectra toward the blue and sharpened the absorption bands. Leaves infiltrated with water showed no shift in their absorption spectra, but rather a decrease in absorption throughout most of the visible region and a sharpening of the band at 680 mμ. Some data relative to the absorption spectrum of the pigment complex freed from interference by the leaf structure were obtained by comparing the absorption spectra of leaves and leaf extracts with those of chloroplast and disintegrated chloroplast suspensions. [From authors' summary.]

3284. PULESTON, H. S., FULTS, J. L., AND PAYNE, M. G.
Uracil protection against ultraviolet radiation damage to a higher plant.
Science, 1952, **115**: 402-3, bibl. 6.

Six-day-old etiolated Alaska pea seedlings sprayed with 500 and 1,000 μg. of uracil were afforded significant protection against ultraviolet radiation damage when compared with seedlings sprayed with distilled water. Uracil at 200 μg. gave no significant protection. No phytotoxic effect was caused by uracil at 1,000 μg.

3285. MILLER, C. O.
Relationship of the cobalt and light effects on expansion of etiolated bean leaf disks.
Plant Physiol., 1952, **27**: 408-12, bibl. 3, being *Pap. Dep. Bot. Plant Path. Ohio St. Univ.* **535**.

As the expansion of etiolated bean leaf disks in the dark is promoted either by briefly exposing the disks to light or by placing them on a medium containing cobalt salts, it has been suggested that there is a close relationship between the light and cobalt effects. Investigations concerning this relationship are reported in this paper. It was found that both light and cobalt influence processes which lead to cell enlargement. Both light and cobalt promoted leaf expansion in pea, but neither did so in radish or *Chenopodium album*; thus both effects occur in the same plant material. Elongation and straightening of the hooked portions of hypocotyls, stems and petioles of bean seedlings occurred as a result of exposure to light or of adding cobaltous salts to the basal medium. The time/expansion curves for leaf disks given cobalt-light, cobalt-dark, light, and dark treatments showed no characteristic differences. The effects of cobalt and light were additive. These findings support the idea that both cobalt and light affect the same limiting condition, possibly by different means.

3286. WHITTINGHAM, C. P.
The chemical mechanism of photosynthesis.
Bot. Rev., 1952, **18**: 245-90, bibl. 126.

A review is given of the present state of knowledge on photosynthesis in the light of recent work with tracer elements and physico-chemical investigations. It is considered that comparative studies of the rate of photosynthesis and of the rate of individual steps in the process as represented, for example, by the chloroplast reaction and by tracer studies, present the most promising approach to the physiology of the process.

3287. OUELLET, C.
The path of carbon in photosynthesis. XII. Some temperature effects.
J. exp. Bot., 1951, **2**: 316-20, bibl. 9.

The photosynthetic assimilation of radioactive carbon dioxide for 2-minute periods by *Scenedesmus* has been studied at temperatures ranging from 25° to 44° C. All labelled intermediates cease to be formed at about 45° C. With rising temperature, the radioactivity reaching the sugar phosphate reservoirs decreases regularly while there is a sharp maximum in sucrose at

37° C., and a less pronounced one in malic and aspartic acids above 40° C. A tentative interpretation of these effects is offered. [Author's summary.]

3288. BENSON, A. A., AND OTHERS.
The path of carbon in photosynthesis. XV. Ribulose and sedoheptulose.
J. biol. Chem., 1952, **196**: 703-16, bibl. 25, illus.

Sedoheptulose and ribulose phosphates have been identified in a varied group of photosynthetic organisms. These phosphates are among the earliest sugar phosphates formed during photosynthesis. The biosynthetic relationships of sedoheptulose and ribulose are discussed. It is suggested that they are not directly involved in hexose synthesis but may serve as sources of C_2 carbon dioxide acceptors required during photosynthesis. [Authors' summary.]

3289. DE RAGGIO, N. M., AND RAGGIO, M.
Influencia de pulverizaciones de cera suspendida sobre transpiración, fotosíntesis y respiración en *Vicia faba* L. **(The effect of wax suspension sprays on transpiration, photosynthesis and respiration in *Vicia faba*.)** [English abstract ½ p.]
Phyton, 1951, **1**: 90-102, bibl. 5.

A wax suspension was sprayed on to young broad bean plants subjected to various environmental conditions. When the soil moisture was kept constant at 15%, an average reduction in transpiration of 57·6% was obtained as a result of the wax spray, there being practically no difference in effectiveness between the first and the tenth (final) day of the experiment. With decreasing soil moisture, the effectiveness of the spray decreased. An average decrease of 25% apparent photosynthesis was recorded in the treated plants. The treatment slightly increased the rate of respiration.

3290. HANLY, V. F., ROWAN, K. S., AND TURNER, J. S.
Malonate and carrot root respiration.
Aust. J. sci. Res., Ser. B, biol. Sci., 1952, **5**: 64-95, bibl. 57.

Following a review of earlier work with malonate as an enzyme and respiration inhibitor, direct evidence is provided of the existence in carrot root tissue of cytochrome oxidase and succinic dehydrogenase (S.D.). Malonate is clearly effective as an inhibitor of carrot root respiration only at low pH. Its effects at higher pH are, however, fully described and discussed. It is postulated that in this tissue a significant part of the respiration is mediated by enzyme systems not inhibited by malonate, KCN, or CO; that the remainder, whose activity is varied by wounding and aging, and by ionic exchange and uptake, involves an organic acid cycle of the Krebs type. The effects of low pH and low concentration of malonate (0·005–0·02M) may be explained as due to inhibition of succinic dehydrogenase only; under these conditions self reversal of inhibition and reversal by addition of succinate are both possible. At higher concentrations (0·04–0·05M) and low pH, malonate is assumed to inhibit not only S.D. but other enzymes concerned in pyruvate oxidation; this explains the lack of self reversal, lack of reversal by added succinate, and the failure to demonstrate accumulation of succinate in poisoned tissue; under these conditions, when inhibition is to the basal level, the R.Q. is high, presumably because pyruvate is diverted to form fermentation products. [Authors' summary.]—Univ. Melbourne.

3291. ARISZ, W. H., HELDER, R. J., AND VAN NIE, R.
Analysis of the exudation process in tomato plants.
J. exp. Bot., 1951, **2**: 257-97, bibl. 41, illus.

This investigation was made at the Botanical Laboratory, Groningen, to determine how far water displacement in plants is due to salt secretion as well as to osmotic pressure. It was demonstrated that by enhancing the concentration of the medium the exudation rate rapidly decreases. This is followed by a slower rise to a new level which is the consequence of the salt secretion that continues and enhances the osmotic value of the exudation sap. After some time secondary changes of the exudation rate appear. In lowering the concentration of the medium identical changes occur, but in the reverse direction. By tracing the influence of adding substances different in mol. weight and lipoid solubility it could be established that the gradual change was the result of salt secretion and not of permeation of the added substance. Formulae are given for calculating the salt secretion, the osmotic value of the exudation sap, and the conductivity for water of the root system. Important factors in exudation are water conductivity of the protoplasm and salt secretion into the xylem. Both factors are influenced by the osmotic value of the outer solution and by the presence of ions in the outer solution. The two factors must have an identical influence on the transport of water into the transpiration stream.

3292. HAINES, F. M.
The absorption of water by leaves in an atmosphere of high humidity.
J. exp. Bot., 1952, **3**: 95-8, bibl. 1.

No evidence could be obtained for any active exudation of water by the roots of tomato plants with the foliage in an atmosphere of high humidity. In as far as the plants remained healthy and grew, the absorption of water by the leaves as reported by Breazeale [see *H.A.*, 20: 2864] is confirmed. [Author's summary.]—Queen Mary College, London.

3293. BÖHNING, R. H., SWANSON, C. A., AND LINCK, A. J.
The effect of hypocotyl temperature on translocation of carbohydrates from bean leaves.
Plant Physiol., 1952, **27**: 417-21, bibl. 3, illus., being *Pap. Dep. Bot. Plant Path. Ohio St. Univ.* **537**.

In these experiments the temperature of the hypocotyl of bean (*Phaseolus vulgaris*) seedlings was varied within the range of 7 to 40° C. by means of jackets, while the temperature of the rest of the plant was maintained at 25 ±1° C. Hypocotyl temperature markedly affected the elongation of the stem above the primary leaves, the effect being similar to that of petiole temperature observed in earlier studies [see *H.A.*, 22: 32]. Maximum transport of both naturally occurring and artificially supplied carbohydrate, as measured by stem elongation, occurred at a temperature of approximately

33° C. The data suggest that hypocotyl temperatures, within physiological limits (7 to 40° C.), but ranging from limiting to inhibitory levels, affect phloem transport accordingly in all other parts of the plant. The technique used did not prove adequate for assessing the effect of hypocotyl temperature on the rate of food transport to the roots.

3294. Link, G. K. K., Klein, R. M., and Barron, E. S. G.
Metabolism of slices of the tomato stem.
J. exp. Bot., 1952, **3**: 216-36, bibl. 47.
The authors introduce this paper as presenting the results of studies of carbohydrate, fat and amino-acid metabolism of the tomato stem. It also integrates the results of isolated investigations of the metabolic reactions in various organs of the tomato plant in an attempt to indicate possible pathways of metabolism in the tissues of the stem.—University of Chicago.

3295. Brown, R., and Wightman, F.
The influence of mature tissue on division in the meristem of the root.
J. exp. Bot., 1952, **3**: 253-63, bibl. 12.
Observations made at the University of Leeds on isolated pea roots grown in sterile conditions indicate that division in the meristem depends partly on the synthesis of appropriate metabolites in the meristem and partly on a supply of metabolites from mature regions of the root.

3296. Sheldon, V. L., Blue, W. G., and Albrecht, W. A.
Biosynthesis of amino acids according to soil fertility. II. Methionine content of plants and the sulfur applied.
Plant and Soil, 1951, **3**: 361-5, bibl. 6.
Studies of the methionine content of plants in relation to sulphur were made at the Missouri Agricultural Experiment Station. Increases in the sulphur supplied to plants caused increases in their methionine content.

3297. Van Fleet, D. S.
Histochemical localization of enzymes in vascular plants.
Bot. Rev., 1952, **18**: 354-98, bibl. 246.
Literature on the subject is reviewed, the relative merits of some of the methods used are discussed, and the bearings of the work on problems of differentiation and maturity are indicated,

3298. Nesmejanov, A. N.
Indicator atoms. [Russian.]
Priroda, 1952, **41**: 3: 28-40, bibl. 16, illus.
This is a review of information on radioactive elements and of their use as indicators in biological investigations, including their application to research on the physiology of plants. The illustrations include radiographic photographs of (1) a tobacco plant, with mosaic, grown in a medium containing radioactive phosphorus, (2) a tomato plant fertilized with radioactive potassium, showing the potassium accumulated in the marginal points of the leaves, and (3) a pea plant which had received a radium-containing nutrient, the radium shown to be accumulated in the apical parts of the plant.

Growth substances.

(*See also* 3350a, c, w, x, 3351b, c, 3398-3400, 3443, 3444, 3446-3451, 3477w, 3483, 3490, 3499, 3500, 3513, 3531, 3532, Weeds and weed control section, 3815, 3827-3829, 3870, 3951-3953, 4015, 4016, 4017f, 4036, 4037, 4249-4251, 4287, 4319, 4322, 4400, 4403, 4431, 4456, 4524.)

3299. Jacobs, W. P.
The role of auxin in differentiation of xylem around a wound.
Amer. J. Bot., 1952, **39**: 301-9, bibl. 36, illus.
The hypothesis that auxin is the hormonal factor normally limiting the differentiation of xylem during the regeneration of a severed vascular strand in an internode has been confirmed in the following ways: (1) Auxin has been shown to be normally present in very small amounts in *Coleus* internodes: hence, it may conceivably be acting as a limiting factor. (2) The strong basipetal movement of auxin is paralleled by a strong basipetal polarity of xylem regeneration; the relatively small acropetal movement of auxin is paralleled by a slight acropetal differentiation of xylem. (3) Removal of all the leaves and buds below the wound has no effect on xylem regeneration. (4) Removal of the leaves and buds above the wound markedly reduces the amount of xylem regeneration, the amount of reduction varying with the number of auxin-sources removed. (5) A concentration of synthetic auxin such as normally comes from leaf No. 2, the major auxin source, completely replaces the xylogenic effect of the leaves and buds above the wound. The discovery of significant acropetal movement of auxin when physiological concentrations are used in short-time experiments is discussed in relation to older literature on auxin-polarity. The significance of the evidence that the peculiar pattern of differentiation of xylem cells is limited normally in the plant by a known hormone is discussed in relation to normal development. [From author's summary.]—Princeton Univ., N.J.

3300. Zeller, A., and Gretschy, G.
Wirkstoffe als Wurzelausscheidungen von Kulturpflanzen. I. Testpflanzen. (**Hormones as root secretions of cultivated plants. I. Test plants.**)
Veröff. Bundesanst. alpine Landw. Admont, Hft. **6**, 1952, pp. 124-37, bibl. 10.
Before attacking his main problem, the relation between root secretion of crop plants and soil sickness, the author developed a technique for the evaluation of hormone action which is similar to the cress root test elaborated by Moewus [see *H.A.*, 19: 1722, 1723.] He found that the seedling roots of camomile, flax, rape, wheat and cucumber are suitable objects for quantitative tests, the increase in growth during a given time being a measure of the amount of hormone present. The response of the plants to 8 concentrations of α-naphthylacetic acid was shown to differ from species to species.

3301. McEwen, D. M.
Cancerous response in plants.
Nature, 1952, **169**: 839, bibl. 11.
Bacteria-free tumour tissue obtained from primary

galls of *Helianthus annuus* was implanted in healthy stem segments isolated from sunflower seedlings. The host stocks which supported such implants showed a stimulatory response similar to that obtained from high concentrations of auxin. In cases where the implant died after about two days, the host exhibited a limited stimulatory response and a delayed necrosis comparable with that of control stems and stems treated with low concentrations of growth hormones. However, 5% of the stems bearing dead implants produced a tumorous protuberance which arose from the apical callus of the host two weeks after implanting. The growth behaviour of this new tumour tissue was identical with that of autonomous crown-gall tumour tissue. Explanations of the host response to growing and to short-lived tumour implants are suggested.—University of Western Ontario, London, Canada.

3302. APPLER, H.
Über die Tumorbildung durch *Pseudomonas tumefaciens* und durch Heteroauxin an *Helianthus annuus*. (The inducement of tumour formation in *Helianthus annuus* by *Pseudomonas tumefaciens* and heteroauxin.)
Biol. Zbl., 1951, **70**: 452-69, bibl. 29, illus.
The responses of sunflower to *Pseudomonas tumefaciens* infection and to heteroauxin treatment and the histology of the tumours induced were found to have many features in common.

3303. WEINTRAUB, R. L., AND OTHERS.
Studies on the relation between molecular structure and physiological activity of plant growth-regulators. I. Abscission-inducing activity.
Bot. Gaz., 1952, **113**: 348-62, bibl. 16.
1. Excision of the terminal bud of the seedling of *Phaseolus vulgaris* var. Black Valentine results in the formation of an abscission layer in the subjacent internode. A similar result can be induced by application of various chemicals to the intact bud. 2. The most effective compounds found, in tests of more than six hundred substances, were certain 2,3,5-trihalogenated benzoic acids; a large number of other compounds of considerable structural diversity also exhibit activity. 3. The abscission-inducing activity of 2,3,5-triiodobenzoic acid (TIBA) can be counteracted by concurrent application of a number of compounds including 3-indoleacetic acid and 1-naphthaleneacetic acid. [Authors' summary.]—Camp Detrick, Md.

3304. THIMANN, K. V.
The role of ortho-substitution in the synthetic auxins.
Plant Physiol., 1952, **27**: 392-404, bibl. 19, illus.
Three derivatives of phenoxyacetic acid, in which both positions ortho to the side chain are substituted, were found active as auxins in the pea test. These are 2,6-dichloro-, 2,4,6-trichloro- and 2-methoxy-4,6-dichloro-phenoxyacetic acids. The 3,5-dichloro-derivative, however, is quite inactive. In phenylacetic acid, while 2,4-dichloro-substitution increases activity, the corresponding 2,4-dinitro-substitution decreases it. The compound 2,3,6-trichlorobenzoic acid is highly active, more so than indoleacetic acid, but the activity of the aldehyde is very much lower and does not vary uniformly with concentration. For this reason its slight activity is considered to be due to its conversion to the acid in pea stem tissue. Two other chlorinated benzoic acids were found inactive. The activities of several other compounds are reported. Several compounds, including some with and some without auxin activity, are shown to have synergistic action in the pea test. The results are discussed in the light of two proposed new rules for the relation between structure and activity. It is concluded that neither of these rules, namely, (a) that activity requires two free positions para to one another, and (b) that activity requires one free position ortho to the carboxyl, is consonant with all the facts, though some evidence, both here and in the literature, favours each of them. There is also some indication that benzoic acid derivatives may obey an opposite rule to that for phenoxyacetic and phenylacetic acid derivatives. Arguments in favour of the conclusion that a definite chemical reaction does take place at one or more positions on the ring are summarized. It is considered that this general conclusion is consonant with all the data. A detailed theory, to account for the powerful effects of specific substitutions, is proposed. [Author's summary.]—Harvard University, Cambridge, Mass.

3305. HOFFMANN, O. L., FOX, S. W., AND BULLOCK, M. W.
Auxin-like activity of systematically substituted indoleacetic acid.
J. biol. Chem., 1952, **196**: 437-41, bibl. 16, illus., being *J. Pap. Ia agric. Exp. Stat.* **J-2035**.
The effects of sixteen substituted indole-3-acetic acids and one eutectic mixture have been tested for cell elongation and proliferation in a variety of tomato, and for curvature of split pea stem. Substitutions in the pyrrolene radical tend to inactivate the molecule. Substitutions in the phenylene residue yield in some cases compounds of enhanced activity. One of these, 4-chloroindole-3-acetic acid, is considerably more active than the parent compound. Theoretical implications to the relationship of structure and activity are discussed. [Authors' summary.]

3306. KENTEN, R. H., AND MANN, P. J. G.
The oxidation of amines by extracts of pea seedlings.
Biochem. J., 1952, **50**: 360-9, bibl. 28.
A colorimetric test, based on the oxidation of added Mn^{++} to Mn^{+++}, is described for the detection of hydrogen peroxide in plant extracts. By means of this test, evidence has been obtained that hydrogen peroxide is produced by enzyme systems present in extracts of many higher plants. The oxidation of both mono- and di-amines is catalysed by extracts of pea and lupin seedlings and leaves of lavender and red clover. It is not yet known whether this is due to the presence of specific mono- and di-amine oxidases. With the growth conditions used, activity appears in pea seedlings, mainly in the cotyledons, 3-4 days after germination and is maximal over the period 7-18 days. Only slight activity is found in the adult plant. It is suggested that 3-indolylacetic acid may be formed by the successive action of the plant amine oxidase and

of the aldehyde oxidase on tryptamine. [From authors' summary.]

3307. Mayer, A. M., and Evenari, M.
The relation between the structure of coumarin and its derivatives, and their activity as germination inhibitors.
J. exp. Bot., 1952, **3**: 246-52, bibl. 11.
Examination at the Hebrew University, Jerusalem, of a large number of substitution derivatives of coumarin indicated that its activity as a germination inhibitor is due to its specific structure, consisting of an unsaturated lactone linked to an unsubstituted benzene nucleus.

3308. Zimmerman, P. W., Hitchcock, A. E., and Prill, E. A.
Substituted benzoic acids as growth regulators.
Contr. Boyce Thompson Inst., 1952, **16**: 419-27, bibl. 12, illus.
In experiments with some substituted benzoic acids 2,6-dichlorobenzoic and 2,6-dichloro-3-nitrobenzoic acids induced cell elongation, cell division, adventitious roots, and formative effects on plant organs. The corresponding aldehyde of 2,6-dichlorobenzoic acid caused the formative effects only. *Stevia* plants readily translocated the acid upward and downward, while the corresponding aldehyde was translocated readily upward, but either not at all or only slowly downward. 2,3,6-trichlorobenzoic acid and the corresponding aldehyde caused similar responses when applied to tomato and *Stevia* plants.

3309. Smith, M. S., and Wain, R. L.
The plant growth-regulating activity of *dextro* and *laevo* α-(2-naphthoxy)propionic acid.
Proc. roy. Soc. Ser. B, 1951, **139**: 118-27, bibl. 30, illus.
(±)-α-(2-naphthoxy)propionic acid, an active plant growth-regulating substance, has been resolved into its *dextro* and *laevo* rotatory enantiomorphs by fractional crystallization of its (+)-cinchonine salts. The pure stereoisomers have been examined for their effect in inducing a range of growth responses, depending upon cell division, cell enlargement, or both. For these purposes, the Went pea test and the *Avena* cylinder test have been used for critical assessment in the laboratory. In addition, the capacity to induce an epinastic response in the tomato plant, to induce rooting in cuttings and to stimulate parthenocarpic development of the unfertilized ovaries of the tomato and pear have been examined. An effect on the flowering laterals of the hop is also described. In all cases the (+)-isomer was found to possess high activity, whereas very little, if any, was shown by the (−)-isomer. Although the relative activities of *dextro* and *laevo* rotatory forms of an optically active plant growth substance have been previously investigated, the present results demonstrate for the first time that one optically active form of a growth substance can induce pronounced and varied growth responses when applied to plant tissue or intact plants, whereas its enantiomorph can possess negligible activity. The results are discussed in the light of a theory which presupposes that in the primary stages of growth-regulating activity, three essential groupings of the growth substance molecule become associated with specific receptor groups in a surface boundary at the site of action. On this basis only one isomer can possess appreciable activity and the other will be inactive. These considerations are not inconsistent with results obtained in studies on the growth-regulating activity of aryloxyacetic and *-iso*butyric acids. [Authors' summary.]—Wye College, Univ. London.

3310. Rhodes, A.
The influence of the plant growth-regulator, 2-methyl-4-chlorophenoxyacetic acid, on the metabolism of carbohydrate, nitrogen and minerals in *Solanum lycopersicum* (tomato).
J. exp. Bot., 1952, **3**: 129-54, bibl. 12.
The effects of foliar applications of phytocidal concentrations of MCPA on certain aspects of metabolism were studied in tomato plants at Jealott's Hill Research Station in 1951, observations being made for 14 days after spraying. They were: (1) a great reduction of growth, net assimilation and (apparently) of uptake of total N and P_2O_5; (2) in the plant as a whole and in the tops a reduced rate of increase of available carbohydrate but no actual depletion; in the roots of plants supplied with only distilled water after treatment and of controls a steady increase in available carbohydrate throughout the experiment; in the roots of treated plants supplied with nutrient after spraying available carbohydrate increased very slightly during the first 2 days, fell to below the initial point in the next 2 days and remained at this low level for the rest of the experiment; (3) net synthesis of starch was prevented but not an appreciable net synthesis of sucrose; and (4) uptake of K, Ca and Mg appeared to be unaffected. These results suggest that the phytocidal effect in the presence of nutrient may be due to depletion of available carbohydrate supplies in the roots, and offer an explanation of the fact that vigorously growing plants are more easily killed while perennials, especially those with storage tissue in the roots, are more resistant.

3311. Bradbury, D., and Ennis, W. B., Jr.
Stomatal closure in kidney bean plants treated with ammonium 2,4-dichlorophenoxyacetate.
Amer. J. Bot., 1952, **39**: 324-8, bibl. 8, illus.
Top or soil treatments of kidney bean plants with ammonium 2,4-dichlorophenoxyacetate were followed by partial stomatal closure. After leaf treatments the degree of stomatal closure increased, and the extent of reopening of the stomata decreased as the concentration of applied ammonium 2,4-dichlorophenoxyacetate was raised from 10 to 1,000 p.p.m. Evidence obtained indicated that early stomatal closure in treated leaves was a direct effect of the growth-regulator on leaves rather than an indirect effect on the water-absorbing mechanism of the roots. [Author's summary.]—Camp Detrick, Frederick, Md.

3312. Weintraub, R. L., and others.
Metabolism of 2,4-dichlorophenoxyacetic acid. I. $C^{14}O_2$ production by bean plants treated with labeled 2,4-dichlorophenoxyacetic acids.
Plant Physiol., 1952, **27**: 293-301, bibl. 7.
As the initial phase of a study of the transformation of C^{14}-labelled 2,4-D in higher plants, the production of

radioactive carbon dioxide was studied. The results showed that " radioactive carbon dioxide is produced by plants which have been treated with 2,4-dichlorophenoxyacetic acids containing C^{14} in either the carboxyl or the methylene positions. The evolution of $C^{14}O_2$ continues at a relatively low rate during a period of several days. The initial rate of production from carboxyl-labeled 2,4-D is several times that from methylene-labeled 2,4-D. No carbon dioxide is evolved from the ring carbon at position 1."—Camp Detrick, Frederick, Md, and Tracerlab Inc., Boston, Mass.

3313. CARROLL, R. B.
Activation of sodium 2-(2,4-dichlorophenoxy)-ethyl sulfate.
Contr. Boyce Thompson Inst., 1952, **16**: 409-17, bibl. 11, illus.

The results are described of tests on the effect of hydrogen-ion concentration on the activation of the growth-regulating substance sodium 2-(2,4-dichlorophenoxy)ethyl sulphate and on the effect of riboflavin in counteracting its activity and that of related substances.

3314. VELDSTRA, H.
Remstoffen en remming van enzym-systemen. **(Growth inhibitors and inhibition of enzyme systems.)** [English summary 15 lines.]
Reprint from *Chem. Weekblad*, 1951, **47**: 978-93, bibl. 102.

In a review of the literature on growth inhibitors of plant and animal tissues, an analysis is made of the extent to which growth inhibitors act on enzyme systems. The physiological importance of natural inhibitors within the plant is indicated and the types of inhibition that can be induced artificially are discussed.

3315. SMITH, M. S., WAIN, R. L., AND WIGHTMAN, F.
Antagonistic action of certain stereoisomers on the plant growth-regulating activity of their enantiomorphs.
Nature, 1952, **169**: 883-4, bibl. 4.

An examination was made of the behaviour of the two stereoisomeric forms of certain α-aryloxypropionic acids, viz. of active (+)-α-(2-naphthoxy)-, (+)-α-(2:4-dichlorophenoxy)- and (+)-α-(2:4:5-trichlorophenoxy) propionic acids, in the presence of increasing amounts of the corresponding inactive (−)-enantiomorph in the *Avena* cylinder test. The accompanying graph illustrates the finding that the activity shown by a range of concentrations of the (+)-isomers could be partially or even completely antagonized by the presence of large amounts of the (−)-isomers. The theoretical implications are briefly discussed.—Wye College, Kent.

3316. ÅBERG, B.
The interaction of some auxin antagonists and 2,4-D in root growth.
Physiol. Plant., 1951, **4**: 627-40, bibl. 9.

The effects of 8 different α-(naphthylmethyl-sulphide or -selenide)-alkyl-carboxylic acids on the root growth of young flax seedlings in solution culture have been determined for the concentration range 10^{-6}—10^{-4}. —Royal Agricultural College, Uppsala.

3317. LEOPOLD, A. C., AND OTHERS.
Chelidonic acid and its effects on plant growth.
Physiol. Plant., 1952, **5**: 85-90, bibl. 9, being *J. Pap. Purdue Univ. agric. Exp. Stat.* **585**.

The action of chelidonic acid on growth has been studied by means of the pea straight growth test. The following conclusions have been drawn: 1. Chelidonic acid is a naturally occurring inhibitor of growth in plants. 2. It is capable of inhibiting growth at concentrations of 10^{-5} *M*, a concentration 1,000 times more dilute than it sometimes occurs naturally. 3. Its inhibitory action cannot only be relieved, but actually be changed into a promotive action by the presence of auxin. At 10^{-5} *M*, growth is increased 17 per cent. in the presence of 0·1 mg./l indole acetic acid and inhibition effects are first found at 4×10^{-4} *M*. This type of behaviour is characteristic of synergists of auxin such as the unsaturated lactone, coumarin. 4. The inhibitory effect of chelidonic acid can be relieved by the sulfhydryl compound 2,3 dimercapto-1-propanol (BAL). It is suggested that chelidonic acid may act in growth by the same means as does coumarin. [Authors' summary.]

3318. LEOPOLD, A. C., AND KLEIN, W. H.
Maleic hydrazide as an anti-auxin.
Physiol. Plant., 1952, **5**: 91-9, bibl. 21, being *J. Pap. Purdue Univ. agric. Exp. Stat.* **527**.

1. Using standard pea growth tests, the action of maleic hydrazide on growth has been investigated. 2. Maleic hydrazide was found to be a growth inhibitor. In the absence of auxin it inhibits growth at concentrations as low as 0·1 mg./l, or 9×10^{-7} *M*; 50 per cent. inhibition is obtained with about 1·0 mg./l. Since it is apparently incapable of promoting growth in the absence of auxin, it is not a growth regulator. 3. Inhibition of growth by low concentrations of maleic hydrazide is completely relieved by the addition of auxin. 4. Conversely, inhibition of growth by high concentrations of auxin can be relieved by the addition of maleic hydrazide. Tests with pea roots show this reversal of auxin inhibition to be independent of any pH change. 5. No evidence could be found which would indicate that the inhibitor acts by directly combining with auxin *in vitro*. 6. It is concluded that maleic hydrazide is an anti-auxin, and acts in opposition to auxin in growth. [Authors' summary.]

3319. WATSON, D. P.
Retardation in cell development in leaf and flower buds of *Phaseolus vulgaris* L. from foliar applications of maleic hydrazide.
Bull. Torrey bot. Cl., 1952, **79**: 235-41, bibl. 13, illus.

To study the effect of maleic hydrazide on the structure of their developing parts, young bean plants grown under controlled conditions were sprayed with a 500 p.p.m. solution of maleic hydrazide. Inhibition of growth of all vegetative parts and of cell development resulted, but there was no apparent abnormal cell multiplication. Abscission of parts followed by rapid growth of axillary buds occurred. Reproductive parts developed in the bud before abscission.

3320. Compton, W.
The effects of maleic hydrazide on growth and cell division in *Pisum sativum*.
Bull. Torrey bot. Cl., 1952, **79**: 205-11, bibl. 7.

Seeds of *Pisum sativum* were treated with 10, 50, 100, 300, 500 and 1,000 p.p.m. solutions of maleic hydrazide in order to determine the effects of maleic hydrazide on cell division and elongation in the root and shoot tips and on total growth in relation to its effects on these two processes. Inhibition of growth occurred in treatments at and above 100 p.p.m. and of cell division in treatments at and above 50 p.p.m. There was a greater percentage of mitosis in the shoot tips than in the root tips.

3321. Moewus, F., Moewus, L., and Skwarra, H.
Nachweis von zwei Wuchsstoffen in Samen und Wurzeln der Kresse (*Lepidium sativum*). **(Identification of two growth substances in the seed and roots of garden cress.)**
Planta, 1952, **40**: 254-64, bibl. 12.

Apart from heteroauxin a second growth substance was found in cress seed and root extracts, similar in action and probably identical with phenylacetic acid.—Max-Planck-Inst. f. medizinische Forsch., Heidelberg.

Soil problems.

(*See also* 3758, 4446.)

3322. Albert, A. R.
Better crops and incomes from sandy soils.
Circ. Univ. Wis. Ext. Serv. **402**, 1951, pp. 32, illus.

Land use, soil management, manuring and irrigation on the sandy soils of Wisconsin are dealt with. The crops mentioned are mainly agricultural, but fertilizer recommendations are made for irrigated potatoes, and it is suggested that one or more high return crops, such as strawberries or cucumbers, should be grown on every irrigated farm.

3323. Browning, A. R., and Baumgart, I. L.
Soil changes on an Auckland property following intensive cultivation.
N.Z. J. Sci. Tech. Sect. A, 1952, **34**: 92-6.

Pasture land on an Auckland property was put under intensive cultivation with fruit and vegetable plots. Eleven years later analyses showed that there had been considerable soil erosion, soil structure had deteriorated, and as much as 50% of organic matter had been lost.—D.S.I.R., Wellington.

3324. Constable, D. H., and Pollard, A. G.
Effects on soils and crops of varying depths of cultivation. I.—Some preliminary observations.
J. Sci. Food. Agric., 1952, **3**: 157-60, bibl. 9.

The effects on the moisture content, and on the concentration of the major nutrients Ca, Mg, N, P, and K in the soil solution, of ploughing to different depths, and certain effects on the crops [potatoes and carrots] have been studied. A few significant differences are shown, but there has been no consistent trend, nor does any particular plough depth appear superior to the others as a whole. [Authors' synopsis.]—Imperial College, London.

3325. Simonneau, P.
Note sur la résistance au sel de quelques plantes cultivées. **(Note on the resistance to salt of certain cultivated plants.)**
Fruits et Prim., 1951, **21**: 319-22, bibl. 8.

This is an account of observations made on the reaction of various crop plants to the saline soils of the subcoastal plains of Oran, Algeria, with reference to cereals, fodder plants, industrial plants, market garden crops, and tree fruits (apple, citrus, olive, pomegranate) A summary of the results in order of increasing tolerance is as follows: (1) non-woody plants: *very weak*—haricot, peas; *weak*—French beans, oats, barley, wheat; *medium*—onion, garlic, carrot, potato, peppers, barley, melilot, flax; *resistant*—melon, watermelon, pumpkin, tomato, artichoke; *very resistant*—lucerne, cotton, cabbage. (2) woody plants: *very weak*—citron, clementine, orange, mandarin, pomelo, apple; *medium*—olive; *resistant*—pomegranate.

3326. Dorsman, C., and Wattel, M.
De inundaties gedurende 1944-1945 en hun gevolgen voor de landbouw. VII. Zoutschade bij tuinbouwgewassen. **(The inundations of 1944-45 and their effect on agriculture. VII. Salt damage to horticultural crops.)** [English and French summaries, 1 p. each.]
Versl. landbouwk. Onderz. **57.8**, 1951, pp. 55, bibl. 16, illus.

The flooding of Zeeland with sea water during the war created serious horticultural problems. The investigations carried out on these problems from 1944 to 1947 are here reported. Symptoms of, and factors affecting, salt water damage of vegetables and fruits are reviewed. Experiments showed that fruit trees could be planted on flooded soil after an interval of one winter provided the soil was highly permeable. It is advisable to work 3 kg. gypsum into each planting hole and to mulch with farmyard manure to prevent the capillary rising of salt in the summer. It is generally not safe to prune the trees until the second year. Application of gypsum, shallow cultivation and the right choice of covercrop will help to prevent deterioration of the soil. Where the texture of the soil is such that it cannot absorb much rain, shallow trenching is necessary. Gooseberries will only succeed when the soil has completely recovered its texture. For vegetable crops the capillary rising of salt during summer, as well as salinity at sowing time, must be considered. Crops requiring deep cultivation should not be grown. Sowings should be made early on rather coarse, rolled seedbeds. Crust formation should be prevented by a heavy dressing of gypsum. Sowing *in situ* is preferable, where possible, to transplanting. Observations are recorded on the salt susceptibility of various vegetable crops.

3327. Fletcher, H. F., Freeman, J. A., and Anstey, T. H.
Mulching with sawdust.
Circ. exp. Fm Agassiz **401**, 1952, pp. 5, bibl. 3.

The effects of sawdust mulch on the soil and on crops are detailed. While annual weeds are usually controlled by a 2-in. sawdust mulch, perennial weeds should be eradicated prior to mulching. The following crops

have been mulched successfully: blueberries, strawberries, raspberries, brambles, gooseberries, currants, bulbs, rhubarb, asparagus, some nursery stock, and cool season vegetables such as carrots, peas, beets and early cabbage. Sawdust mulch is not recommended for warm season crops such as tomatoes, corn, melons, cucumbers and onions, or for late season crops such as turnips, potatoes, autumn cauliflower and late cabbage, unless a late harvest is desired. Fertilization should be carried out before mulching and methods of sawdust application either before or after sowing or transplanting are described If mulching is discontinued the sawdust can be incorporated in the soil in which case generous N treatments will be required, or it can be removed from the ground and composted. Mention is made of plant injuries caused by sawdust mulch.

3328. Dolgopolov, N. N., and Ruban, E. L.
Peat humates and fossil carbonaceous material as stimulators of plant growth.
[Russian.]
Priroda, 1952, **41**: 3: 102-4.

The advantages of humic substances for stimulating plant growth are said to be, that they do not cause the distortion in plants that is sometimes associated with the application of synthetic substances, that humic acid assists the entrance of phosphorus into the plant, and that the oxidation-reduction processes and enzyme action are stimulated so that vigour and root production are increased. The conclusions are based on the favourable results obtained from growing bean (*Phaseolus*) cuttings in peat paste, peat extracts, and other humic substances obtained from peat. Effective results were also obtained with humates derived from fossil carbonaceous material.

3329. Anon.
Krilium.
Fert. Feed. St. J., 1952, **38**: 81-2.

The new U.S. soil-conditioner Krilium, which will not be available in quantity till 1953, is a polyelectrolyte derived from acrylonite and is said to have wide horticultural potentialities. It is claimed that it has the same crumb-forming effect on soil structure as 200 times its weight of peat moss or 500 times its weight of compost, and that this effect is more immediate and lasts longer. It is a non-toxic, free flowing powder and dry surface conditions are preferable for its application. As the rates of application are very low (0·02–0·1% by weight of soil) it seems likely to be marketed with a diluent or filler.

3330. Edelman, C. H.
Krilium, het nieuwe wondermiddel ter verbetering van de grond. **(Krilium, a new wonder material for soil improvement.)**
Groene Amsterdammer, 9 Feb. 1952, from abstr. in *Bergcultures*, 1952, **21**: 136-7.

Krilium, an artificial resin, has been widely advertised as a soil improver that in very small quantities will make barren soils fertile. It is pointed out that in order to obtain a uniform mixture krilium must be added to the soil in the proportion of 1%. Where this is done to a depth of 50 cm., 750 kg. krilium would be needed per ha. and the cost would be excessive. It is considered that the value of krilium lies, not in soil conservation on a national scale, but in the improvement of town gardens.

3331. Newhall, A. G., and Schroeder, W. T.
New flash-flame soil pasteurizer.
Bull. Cornell agric. Exp. Stat., **875**, 1951, pp. 19, illus.

The oil-burning, flash-flame soil pasteurizer described is an adaptation of a mobile aggregate heater used in road repairs. It effectively controls pre- and post-emergence damping-off, *Phytophthora* foot-rot, *Verticillium* wilt, weed seeds and some sclerotia-forming fungi. It weighs about 600 lb., can be moved on its own wheels or by truck, and has a paraffin consumption of 4-5 gal. per hour. A team of 2 can treat 2 cu. yd. of soil per hour. Soil shovelled in at the upper end of the slightly sloping steel cylinder is raised for a few seconds to a temperature of 175-190° F. before dropping out at the lower end. Organic matter is slightly affected if the soil is too dry when treated.

Nutrition.

(*See also* 3350q, 3759, 3760, 4316, 4452, 4512, 4515, 4517, 4527.)

3332. Canada Science Service and Experimental Farms Service.
Manures, fertilizers and soil amendments: their nature, function and use.
Publ. Canada Dep. Agric. **585**, revised 1951 (issued 1952), pp. 82, illus.

Although mainly concerned with types of manures and fertilizers, their analyses and mixing, and various soil amendments, a chapter is devoted to fertilizer recommendations for particular crops, amongst which are market garden crops, tree fruits, raspberries, strawberries and tobacco.

3333. Wallace, T.
The mineral nutrition of crops. Some recent developments in research.
N.A.A.S. quart. Rev., Spring 1951, No. 11, pp. 93-102, bibl. 54.

This article briefly reviews recent research on the mineral status of crops, nutrient balance and interactions, soil factors affecting the supply of mineral nutrients to plants, and methods of assessing the nutrient requirements of crops.

3334. Valantin, G., Bessuand, J., and Estienne, A.
Méthodes analytiques appliquées au diagnostic foliaire. **(Analytical methods applied to leaf diagnosis.)**
Oléagineux, 1952, **7**: 363-5, bibl. 3.

Describes the analytical methods used in the foliar diagnosis of nutritional deficiencies and manurial requirements of oil palm and other plants, with particular reference to N, P, K, Ca and Mg.

3335. Hewitt, E. J., and Hallas, D. G.
The use of *Aspergillus niger* (van Tiegh.) M strain as a test organism in the study of molybdenum as a plant nutrient.
Plant and Soil, 1951, **3**: 366-408, bibl. 33, illus.

The work described here was undertaken to test the factors which determine the efficient removal of molybdenum contamination in reagents, water and other culture materials and to develop a reliable technique for detecting and estimating this contamination.

[Readers may be interested in Hewitt's recent book "Sand and water culture methods used in the study of plant nutrition" issued as T.C.22 and obtainable from C.A.B., Central Sales Branch, Farnham House, Farnham Royal, Slough, Bucks, 42/- or $6.25. See also Abstract 4512.]

3336. Wood, J. G., and Sibly, P. M.
Carbonic anhydrase activity in plants in relation to zinc content.
Aust. J. sci. Res., Ser. B, biol. Sci., 1952, **5**: 244-55, bibl. 16.

Data from experiments with oats and tomatoes indicate that Zn deficiency reduces carbonic anhydrase activity by blocking metabolic reactions that lead to the formation of protein and not by the absence of sufficient Zn to activate an apoenzyme. With tomato plants carbonic anhydrase activity showed a highly significant positive correlation with both Zn and protein-N contents. Symptoms of Zn deficiency in tomatoes, which first became obvious 47 days after sowing and developed progressively during the next 10 days, are described.

3337. Johnstone, G. R.
Further studies in the simplification of equipment for subirrigation experiments in plant nutrition.
Plant Physiol., 1952, **27**: 405-7, bibl. 2, illus.

The previously described equipment for subirrigation experiments [*H.A.*, 20: 1274n] is convenient to operate but is limited to the culture of small plants. The new type of equipment described here has the advantage that it can be enlarged to accommodate large plants such as tomato without decreasing the convenience of operation. In the new equipment the reservoir is above the seedbed instead of below it. The technique of operation is described.—University of California.

Irrigation.

(*See also* 3434-3436, 4527.)

3338. Rebour, H.
Le sillon d'irrigation large et peu profond.
(The broad, shallow irrigation furrow.)
Fruits et Prim., 1952, **22**: 5-7, illus.

The usual method of irrigation by furrows triangular in section has certain disadvantages. Their shape becomes rounded with use, and they have to be taken to a depth of 20-25 cm. which is harmful to the roots of certain kinds of fruit trees such as citrus. Broad shallow furrows, trapezoid in section 60 cm. wide and 8 cm. deep are recommended, and data are tabulated to show the loss of water in the two systems. A form of machine which might be modified to form broad, shallow irrigation furrows is mentioned.

3339. Korven, H. C.
The effect of wind on the uniformity of water distribution by some rotary sprinklers.
Sci. Agric., 1952, **32**: 226-40, bibl. 8.

Of the 6 types of revolving sprinkler for field and garden use tested at Swift Current, Sask., the Rain Bird 40 W produced a relatively high degree of uniformity when the sprinkler lines were placed across the path of the wind. The Rain Bird 40 at a 50×50 ft. spacing showed promise for sprinkling in high wind, and Rain Bird 20 was found the best for irrigating prairie gardens.

Seeds.

(*See also* 3751, 3752, 4130.)

3340. Munn, M. T., and Little, H. B.
The quality of seeds on sale in New York in 1951.
Bull. N.Y. St. agric. Exp. Stat. **751**, 1952, pp. 52, illus.

Vegetable seed sampling and testing showed that nearly 98% of samples sold met or exceeded minimum standards of quality. Flower seed packets showed an improvement as regards their field performance, since about 80% were judged to be fair to excellent. The germinating capacity of flower seeds was, however, found to be unsatisfactory. Of the lawn seed mixtures sold 48·6% were deficient in some, often minor, respect.

3341. Cavazza, L.
L'azione dell'alcool sui semi duri. **(The action of alcohol on hard seeds.)**
Nuovo G. bot. ital., 1951, **58**: 393-7, bibl. 4.

Seeds were soaked in untreated ethyl alcohol solutions for varying periods of days and in hot solutions for a few minutes. In *Gleditschia triacanthos* the alcohol reduced the swelling of the integument colloids caused by the hot water; after several days cold alcohol caused dehydration and consequently splitting of the integument. Alcohol had no effect when used in the hot treatment of *Hedysarum coronarium* in which action is by splitting.

Seedling illumination.

3342. John Innes Horticultural Institution.
Artificial illumination of seedlings.
John Innes Leafl. **11**, 1952, pp. 7, 9d.

From October to March there is a deficiency of natural light in glasshouses in Britain, which results in a slowing down of vegetative growth. This deficiency can be made good by the correct use of artificial light. High pressure mercury vapour lamps, type MA/H, 400 watt, are recommended for seedling illumination. Details of the price, installation and use of the lamps are given, with special reference to tomato and cucumber seedlings. Seedlings should, immediately after pricking out, be packed pot thick beneath the lamps and left there for 3-4 weeks. One set of lamps can be used to illuminate 2 batches of plants for 12 hr. each a day. Tomatoes must have at least 6 hr. unbroken darkness in 24, but this is not necessary with cucumbers. With seedling illumination early tomato yields may be increased 50-70% and the total yield 10%.

3343. Roodenburg, J. W. M.
High pressure mercury lamp used for irradiation of plants.
J. roy. hort. Soc., 1952, **77**: 219-21.

The high pressure mercury vapour lamp, particularly the 450-watt (Philips HO 2000), is compared with neon-tubes for irradiation of seedlings, the advantage of its having a blue/violet component is pointed out, and methods of use are described.

Practical devices.

(*See also* 3350e, g, m, n, p, r, s, v, z, 3453-3457, 3698-3704, 3761, 3773, 3866, 4035, 4109, 4278, 4281, 4408, 4435, 4457.)

3344. MEIDNER, H.
An instrument for measuring changes in leaf thickness.
S. Afr. J. Sci., 1952, **48**: 210-11, illus.
A brief account is given of an instrument which has been used in the field to record detailed changes in leaf thickness due to changes in leaf water content.

3345. DELVER, P.
Ervaringen met een gewassentoetsdoos.
(Experiments with a NPK plant test kit.)
[English summary ½ p.]
Meded. Dir. Tuinb., 1952, **15**: 8-21, illus.
The feasibility of using a NPK plant test kit of American origin for experimental purposes was proved by using it for testing market garden crops of different chemical composition—tomato, cucumber, cauliflower, kidney bean, and carrot. N-, P-, and K-deficiency symptoms were generally confirmed by the relevant quick tests. The K- test produced the best results, the P-test was less reliable.

3346. ANON.
Glasshouse development. A Dutch light structure on wheels.
Fruitgrower, 1952, No. 2943, p. 957, illus.
An illustrated description is given of a nine-bay Dutch light which can be moved by two men and a winch on fixed concrete plinths and removable wheels. It is stated that to move the structure from one crop to another is the work of about an hour as against a fortnight to empty or refill a permanent house of similar size. The unit has been used successfully over lettuce, then moved over tomatoes while the lettuce matured in the open, and finally set over chrysanthemums. [While new to the U.K., it has been used for some time in Holland.]

3347. WEICK, F. E.
Development of an agricultural airplane.
Agric. Engng St. Joseph, Mich., 1952, **33**: 361-4, illus.
A description is given of an aeroplane designed for dusting, spraying, sowing and fertilizing, and of its dispersing equipment.

3348. ROWLEY, G. D.
Problems of labelling.
J. roy. hort. Soc., 1952, **77**: 215-19, bibl. 9, illus.
Plant labels are discussed in general and a new method of labelling that has proved satisfactory at the John Innes Horticultural Institution is described. Labels typed on unglazed paper are immersed in Perspex solution until thoroughly saturated, then carefully laid face downwards on a clean Perspex slip of appropriate size with one or two holes for fixing, and allowed to dry. The cost of these labels is ruled by the cost of the Perspex sheet and works out at about 2 sq. in. for a penny.

3349. WHITEHOUSE, W. E.
Plastic film in foreign plant shipments.
Amer. Nurserym., 1952, **96**: 18-20, 124-9, bibl. 5, illus.
Among the plant material wrapped in plastic film, usually polythene, which successfully survived long distance transport to and from the U.S. were temperate zone, subtropical and tropical fruit trees and their bud wood, strawberry, raspberry and mint plants, vine and sugar cane cuttings, bamboo rhizomes and mango seeds. The use of plastic film in air layering of litchi and other plants is noted.

Noted.

3350.

a ÅBERG, B.
On the effects of weak auxins and antiauxins upon root growth.
Physiol. Plant., 1952, **5**: 305-19, bibl. 36.

b ARONOFF, S.
Light absorption by chlorophyll at high concentrations.
Plant Physiol., 1952, **27**: 413-16, bibl. 5, illus.

c BRIAN, R. C., AND RIDEAL, E. K.
On the action of plant growth regulators.
Biochim. biophys. Acta, 1952, **9**: 1-18, bibl. 23.
A study on MCPA [or 2-methyl-4-chlorophenoxyacetic acid].

d BROWN, A. H., NIER, A. O. C., AND VAN NORMAN, R. W.
Measurement of metabolic gas exchange with a recording mass spectrometer.
Plant Physiol., 1952, **27**: 320-34, bibl. 13, illus.

e BROWNING, I., AND LOCKINGEN, L. S.
A simple stage-mounted micromanipulator.
Science, 1952, **115**: 646-7, illus.

f BURSTRÖM, H.
Studies on growth and metabolism of roots. VII. The growth action of α-(phenoxy) propionic acids.
Physiol. Plant., 1951, **4**: 641-51, bibl. 21.

g BUSH, V.
Automatic microtome.
Science, 1952, **115**: 649-52, illus.

h CHINLOY, T.
The value of statistics in field experimentation.
J. Jamaican Ass. Sugar Tech. (*J.A.S.T.*), 1949 [issued 1950?], **13**: 12-15 [received 1952].

i CLAYPOOL, L. L., AND MORRIS, L. L.
Air transit of perishables.
Calif. Agric., 1952, **6**: 6: 6, 15.
See *H.A.*, 22: 2042.

j DEPARTMENT OF AGRICULTURE, SOUTH AFRICA.
Key to the agro-economic map of the Union of South Africa.
Bull. Dep. Agric. S. Afr. **320**, [1951?], pp. 29, map, 6d.

k FAGER, E. W.
Photochemical carbon dioxide fixation by cell-free leaf macerates.
Arch. Biochem. Biophys., 1952, **37**: 5-14, bibl. 10.

l GATES, D. M., AND TANTRAPORN, W.
The reflectivity of deciduous trees and herbaceous plants in the infrared to 25 microns.
Science, 1952, **115**; 613-16, bibl. 10.

m JOHNSON, C. M., AND NISHITA, H.
Microestimation of sulfur in plant materials, soils and irrigation waters.
Analyt. Chem., 1952, **24**: 736-42, bibl. 14.

n JOHNSTON, H. W.
Technique for obtaining aseptic seedlings.
N.Z. J. Sci. Tech., Sect. A, 1952, **33**: 6: 87-91, bibl. 3, illus.

o VAN KOOT, Y.
Tuinbouw op de kanaaleilanden. **(Horticulture in the Channel Islands.)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1952, **15**: 325-35, illus.

p KRISTJANSON, A. M., DION, H. G., AND SPINKS, J. W. T.
Hollow cylinder method of measurement of P^{32} in plants.
Canad. J. Tech., 1951, **29**: 496-501, bibl. 4, illus.

q LAL, K. N., AND SUBBA RAO, M. S.
Rôle of zinc in crop production.
Trop. Agriculture, Trin., 1951 (issued 1952), **28**: 117-26, bibl. 92.
A review.

r LEYTON, L.
An improved flame photometer.
Biochem. J., 1952, **50**: xl, bibl. 2.
Full details are to be published in *Analyst*.

s LINDQUIST, A. W.
Radioactive materials in entomological research.
J. econ. Ent. 1952, **45**: 264-70, bibl. 25.
Radioactive isotopes.

t MINISTRY OF AGRICULTURE, LONDON.
Domestic preservation of fruit and vegetables.
Bull. Minist. Agric. Lond. **21**, reprinted 1951, pp. 94, illus., 3s. 6d.
Including notes on home storage of apples, pears and nuts.

u NOGGLE, G. R., AND SCHUMACHER, M. E.
The biosynthesis of carbon-14-labeled compounds. II. The chromatographic separation of the monosaccharides, disaccharides, and trisaccharides from plant extracts.
Plant Physiol., 1952, **27**: 422-6, bibl. 7.

v ODDIE, T. H.
Radioactive isotopes in agricultural research.
J. Aust. Inst. agric. Sci., 1952, **18**: 2-7, bibl. 82.
A review.

w PALEG, L. G., AND MUIR, R. M.
Surface activity as related to physiological activity of plant growth-regulators.
Plant Physiol., 1952, **27**: 285-92, bibl. 12.

x PYNAERT, L.
Au sujet des facteurs de floraison. **(Factors influencing flowering.)**
Bull. agric. Congo belge, 1952, **43**: 55-61, bibl. 3.

y RAZUMOV, V. I.
The significance of long periods of darkness during plant development. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **80**: 269-72, bibl. 8.
Perilla and *Euchlaena mexicana* as test plants.

z REQUINYI, G., AND VÁNYI, F.
Néhány növényi anyagból elöállított indikátor (jelzőoldat) savak és bázisok titrálására. **(Some indicator solutions prepared from plant material for the titration of acids and bases.)** [French and Russian summaries 4 and 6 lines respectively.]
Agrártud. egy.,* 1950, **1**: 53-5 (received 1952].
Fruit, vegetables and flowers were used for the preparation of solutions.

3351.

a RICHARDS, F. J.
Phyllotaxis: its quantitative expression and relation to growth in the apex.
Phil. Trans. Ser. B, 1951, **235**: 509-64, bibl. 23, illus.

b SCHEUERMANN, R.
Der Einfluss wasserlöslicher Vitamine auf die Wirksamkeit von Heteroauxin im Wachstumsprozess der Höheren Pflanzen. **(The influence of watersoluble vitamins on the activity of heteroauxin in the growth process of higher plants.**
Planta, 1952, **40**: 265-300, bibl. 1 p.

c VAN SENDEN, H.
Untersuchungen über den Einfluss von Heteroauxin und anderen Faktoren auf die Blütenbildung bei der Kurztagspflanze *Kalanchoë blossfeldiana*. **(The effect of heteroauxin and other factors on flower formation in the short-day plant *Kalanchoë blossfeldiana*.)**
Biol. Zbl., 1951, **70**: 537-65, bibl. 38, illus.

d STAFFORD, H. A.
Intracellular localization of enzymes in pea seedlings.
Physiol. Plant., 1951, **4**: 696-741, bibl. 90.

e STOCKING, C. R.
The intracellular location of phosphorylase in leaves.
Amer. J. Bot., 1952, **39**: 283-7, bibl. 16, illus.
Leaves of potato, sunflower and tobacco were used.

f STREET, H. E., MCGONAGLE, M. P., AND LOW, J. S.
Observations on the "staling" of White's medium by excised tomato roots. I and II.
Physiol. Plant., 1951, **4**: 592-616, bibl. 21, 1952, **5**: 248-76, bibl. 28.

* Formerly *Bull. Fac. Hort. Buda.*

g TERTS, I.
Talajtani feladatok kertészeti és szőlészeti termesztésünk szolgálatában. **(Soil scientific problems in horticulture and viticulture.)** [English and Russian summaries ½ p. each.] *Agrártud. egy.*,* 1950, **1**: 24-30, [received 1952].

h VARMA, S. R.
A brief history of horticulture in India.
Indian J. Hort., 1952, **9**: 1: 41-9, bibl. in text.
Since about 2500 B.C.

i WANSCHER, J. H.
Farverne, deres natur, ordning og benaevnelse. **(Colours, their nature, arrangement and naming.)** [English summary 1 p.]

* Formerly *Bull. Fac. Hort. Buda.*

Horticultura, 1951, **5**: 99-122, bibl. 10.
With special reference to the British Colour Council's Horticultural Colour Chart.

j WARDLAW, C. W.
The study of growth and form in plants.
Endeavour, 1952, **11**: 97-106, bibl. in text.
A historical review.

k WARDROP, A. B., AND DADSWELL, H. E.
The cell wall structure of xylem parenchyma.
Aust. J. sci. Res., Ser. B, biol. Sci., 1952, **5**: 223-36, bibl. 27, illus.

l ZELLER, A.
Die neuen Verfahren zur Berechnung und Anlage landwirtschaftlicher Versuche (Ein Überblick). **(The new methods of evaluating and designing agricultural trials. A survey.)**
Veröff. Bundesanst. alpine Landw. Admönt, Hft. **4**, 1951, pp. 43-68, bibl. 18.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 3256, 3332, 3350t, 3366, 4508, 4524, 4528, 4531, 4541, 4561.)

3352. SOUTY, J.
La Station de Recherches viticoles et d'Arboriculture fruitière du Sud-Ouest. Son rôle—ses travaux. **(The south-western vine and fruit tree research station. [Pont-de-la-Maye, Gironde, France.] Its aims and work.)**
Jardins Fr., 1952, **6**: 96-106, bibl. 4, illus.
Although organized for its present purposes in 1936 the station did not begin effective work until 1945. Its area is 120 ha. It is specializing in stone fruit trees and for each species a detailed study is to be made of varieties, rootstocks, and agronomic and technical problems. So far attention has been concentrated chiefly on peaches (especially the Angevines and Roussannes) and plums, but cherries and apricots are also being studied. Variety reference collections are being established for peaches and plums; they consist of a general and a reduced collection and reference orchards of important commercial varieties in various production centres. Selection work within certain variety populations of peaches and plums (d'Ente, Reine-Claude, Mirabelle), and in the apricot Rouge de Roussillon, is in progress, as also hybridization of peaches, apricots and plums. Other studies are being made on the technique of prune drying, floral biology, pollination in plums, interspecific crossing, mineral deficiencies, phytohormone action on fruit-drop, seed germination and propagation by cuttings.

3353. LOEWEL, E. L.
Massnahmen zur Erhöhung der Erntemenge und Qualität unseres Obstes unter Ausnutzung des augenblicklichen Standes unserer Kenntnisse auf dem Gebiete der Obstbauwissenschaft. **(Measures to increase yields and quality of fruit by utilizing the present state of our knowledge in the field of horticultural science.)**
Mitt. ObstbVersuchsrings Jork, 1952, **7**: 38-44.
A lecture delivered by the Director of the Obstbauversuchsring Jork, Germany, on results of improvement work obtained at that Institute.

3354. BLACK, M. W.
The deciduous fruit industry in South Africa.
Fmg S. Afr., 1952, **27**: 117-22, 126, bibl. 20.
This historical review of the South African deciduous fruit industry over the past 300 years concludes with a table setting out the principal districts in which each type of fruit is grown and the most important varieties of each being grown today.

3355. INSTITUT NATIONAL AGRONOMIQUE, PARIS.
Notes sur l'agriculture marocaine. **(Notes on Moroccan agriculture.)**
Ann. Inst. nat. agron., 1951, **38**: 64-135.
Brief notes are given on the growing of olives, apricots and almonds, on the new apple, pear and cherry growing project in the Atlas mountains, and on the rapidly expanding citrus- and vine-growing industries.

3356. DUBROVA, P., GORIN, T., AND CEHMISTRENKO, P.
The prospects of orchard development in areas of great communist construction. [Russian.]
Social. seljsk. Hoz., 1952, **23** : 5 : 18-26.
The expansion of Soviet horticulture in areas of developments in canal and hydroelectric station building in the regions of the rivers Don and Volga is outlined in this paper. Recent achievements and future plans to increase fruit and wine production are reviewed, accompanied by a map showing the intensity of plantings envisaged by 1965.

3357. SAS, A.
Collective farm orchards. [Russian.]
Kolhoz. Proizv., 1952, **12**: 5: 18-20.
This is an account of fruit-growing on collective farms in the Kiev province, Ukraine, giving the acreage of the "kolhoz" region under fruit (bush fruit and vines) and the acreages under fruit on selected farms. The work carried out by the orchard "brigades" is set out in some detail.

3358. Ward, K. M.
The apple.
Qd agric. J., 1952, **74**: 13-21, 63-85, illus.
Climatic factors restrict commercial apple growing in Queensland to the Stanthorpe district, which has an elevation of 2,500 to 3,500 feet above sea level. The area for apples, among fruits in the state, is exceeded only by that of pineapples and bananas, and is approximately equalled by citrus. The culture of apples is described in relation to (1) characteristics of the apple tree, (2) botany of flower and fruit, (3) principal Queensland varieties, (4) soil requirements, (5) effects of climate, (6) selection of orchard site, (7) propagation including rootstocks, (8) pollination, (9) pruning and reworking, (10) soil management including organic matter and green manuring and soil and moisture conservation, (11) nutrition with both major and trace elements, (12) harvesting.

3359. White, L., and Macnicol, C.
Tasmanian apple yields.
Quart. Rev. agric. Econ., 1950, **3**: 156-8.
A comprehensive survey in 1948 showed that average apple yields in northern Tasmania were much lower than those of southern Tasmania. The lowest average yields occurred in the largest orchards (over 40 acres) and in the most widely spaced orchards. The highest yields per acre were given by the orchards with the closest spacing, i.e. with over 295 trees per acre. Trees over 30 years in age generally showed a marked decline in production. Yields recorded for 12 varieties showed Tasman's Pride with an average of 3·33 bushels per tree to be much the highest yielding variety, and Cox's Orange Pippin with 1·40 bushels to be the lowest.

3360. Bosq, A.
Le verger à cidre de la Seine-Inférieure. **(Cider apple orchards in Seine-Inférieure.)**
Bull. Soc. centr. Hort. Seine-Infér., 1951, No. 3, pp. 44-51.
The soil and climate of the Seine-Inférieure district of France are ideally suited to cider apple growing. Orchards cover about 50,000 ha. and yield about 60 kg. per tree per annum. In some places spacing is fairly close, but elsewhere the trees are 15-20 m. apart and a haycrop is also taken off the land. Yields could be increased by the use of the best varieties, among which are Mettais, Doux Veret de Carouge, Binet rouge, Antoinette, Muscadet de Dieppe and Bramtot, on standard rootstocks of known identity.

3361. Tricaud, P.
À propos de cerises et du cerisier. **(Cherries and the cherry tree.)**
Pomol. franç., 1952, **79**: 16-20.
The cherry is very widely grown in France, on all soils and under all climates. Its cultivation is favoured by soils derived from granite, not very fertile, but rich in potash, and with a schistose subsoil, porous and tufaceous. It is usually grown as a standard, but dwarf trees, worked on the Sainte-Lucie cherry, are grown as bushes from 3 to 5 metres high; these crop regularly and produce excellent fruit. Notes are given on certain cultural aspects, and varieties recommended are briefly mentioned.

3362. Papasolomontos, A.
Cherry culture.
Countryman, Nicosia, 1951, **5**: 7: 7-9.
The main varieties grown in Cyprus are Early Rivers, Napoleon and Black Tartarian. Among notes on cultivation it is mentioned that both sweet and sour cherry seedlings are used as rootstocks, the former being preferred, seedlings of a variety known as Karthatziotica, which gives a semi-vigorous tree similar to the English Mazzard, being particularly suitable.

3363. Baccialone, J., and Chopinet, R.
Le figuier en Provence. **(The fig in Provence.)**
Jardins Fr., 1952, **6**: 73-8, bibl. 6, illus.
The characteristics, habitat and propagation of the fig are briefly described. In Provence the "early" crop ripens in June-July and the "second" crop in August-October. Both the fresh and the dried fig industries are family affairs, the variety Bellone being specially favoured for drying. The characters are described and the fruits illustrated of the varieties recommended: fruiting twice a year—Cotignane, Dauphine, Sultane, Blanche de Versailles; fruiting once a year—Bellone, Col de Dame blanc, Col de Dame noir, Bourjassotte blanche, Bourjassotte noire, Rolandine blanche.

3364. Noro, K.
Bibliographical studies on the olive tree. I. [Japanese with English summary 2 pp.]
Tech. Bull. Kagawa agric. Coll., 1951, **2**: 149-66, bibl. 123.
The author, who for 30 years has been associated with investigations on the olive in Japan, reviews the literature on its history, culture and research in that country and also cites work done in other countries.

3365. Plaza Prieto, J.
Geografia del olivo mediterraneo y correlación de su producción. **(The geography of the Mediterranean olive and its correlation with production.)**
Bol. oleic. int., 1951, No. 3, pp. 9-30.
A statistical study of the relationship between olive oil production, geography and climate in the chief producing countries of the Mediterranean.

Breeding and varieties.

(*See also* 3477a, d, i, k, s, u, v.)

3366. Mertin, J. V.
Varieties of fruit trees, berry fruits and vines in Australia.
[*Mimeo. Publ.*] *Dep. Health, Div. Plant Quar., Aust.*, 1952, pp. 39.
All the varieties known to be grown in Australia are listed, with the initials of the States in which they are found, of pome, stone and citrus fruits, nuts (temperate and tropical), berry fruits (including currants and gooseberries), tropical and sub-tropical fruits (avocado, banana, breadfruit, custard apple, date, feijoa, guava, mango, papaw, passion fruit, persimmon, pineapple and sapodilla), grape vines, and miscellaneous types (fig, hop, mulberry, olive and pomegranate).

3367. K[EMMER, E.].
Sortenstand und Sortenbewegung im deutschen Obstbau. **(The German fruit variety position.)**
Merkbl. Inst. Obstb. techn. Univ. Berlin-Charlottenburg **6**, 2nd edition, 1952, pp. 27, mimeographed, 0.90 DM.
Officially recognized top and small fruit varieties are listed with notes on whether they appeared in the German variety register in 1857 and 1874 and on the number of agricultural committees that recommended them in 1908, 1932, 1936 and 1951. The list thus reflects what the author calls the " variety movement " over a long period.

3368. BOUREL, —., AND HANGARD, E.
Les pommiers sauvages de la forêt du Rouvray. **(The wild apple trees of Rouvray forest.)**
Bull. Soc. centr. Hort. Seine Infér., 1951, No. 4, pp. 1-6.
Wild apple trees are found singly and in groups in the northwestern part of the Rouvray forest (south of Rouen), chiefly on sites with a fairly clayey subsoil. They are believed to be the relics of ancient forest orchards and are of two main types: *Malus acerba*, and a hybrid form probably arising from *M. paradisiaca*.

3369. ISAEV, S. I.
New winter and autumn apple varieties. [Russian.]
Sad i Ogorod, 1952, No. 6, pp. 12-17, illus.
The author describes his investigations in raising new apple varieties suitable for cultivation in Russia. The characters aimed at include not only high quality, productivity, and different times of ripening, but also resistance to frost injury and to apple scab. The parental varieties for his hybridization work were raised and selected by Mičurin. Eight of the best of his own hybrids are described, four of them as autumn and four as winter varieties, and the particular regions suitable for each are mentioned. All are more or less resistant to frost and two of them are said to be resistant to scab.

3370. ISAEV, S. I.
Developing apple varieties with a prostrate habit. [Russian.]
Sad i Ogorod, 1952, No. 1, pp. 14-18, bibl. 1, illus.
Breeding hardy apples for cultivation in the Urals and Siberia involved selection of material of dwarf and prostrate growth and its hybridization. Several new hardy, prostrate varieties were raised which produced ample fruit of good quality, and the most promising of these seedlings, Stlancevoe (Antonovka × Jonathan) showed resistance to scab.

3371. TIHONOV, N. N.
Apple varieties for growing in prostrate form. [Russian.]
Sad i Ogorod, 1952, No. 1, pp. 18-23, illus.
A list of 10 hardy, early, medium and late apple varieties suitable for cultivation in prostrate lorm in the Krasnojarks region is given. Apparently uniform material was shown to vary in hardiness and productivity when grown in prostrate form. A selection of the more promising clones was made.

3372. COUTANCEAU, —.
Hypothèses relatives aux différences observées chez la variété Passe Crassane. **(Theories on the differences observed in the [pear] variety Passe Crassane.)**
Bull. Soc. centr. Hort. Seine-Infér., 1951, No. 3, pp. 29-34.
Differences exist in the colour, shape and quality of fruit and in growth, flowering characters and fertility of the Passe Crassane pear. These may be due to environmental factors, rootstock, pruning, pollination, the great length of time since the variety was first introduced, and possibly the existence of different strains. The considerable differences in vigour, productivity and fruit quality which exist may well have an adverse effect on the present popularity of the variety and, if there are indeed different strains, the propagation and cultivation of trees of inferior vigour and fertility may result. [This number of *Bull. Soc. centr. Hort. Seine-Infér.* is largely devoted to the pear variety Passe Crassane on the occasion of the 100th anniversary of its introduction.]

3373. MANDELSON, L. F.
Cherry and apple breeding work at Bathurst.
Agric. Gaz. N.S.W., 1952, **63**: 131.
This is a brief note on breeding work aimed at producing (1) cherries resistant to bacterial canker using F12/1 and East Malling resistant stock and two unnamed varieties, which have shown resistance to bacterial canker in field trials as the resistant parents; they were crossed with St. Margaret, Ron's Florence, and Early Lyons for dessert quality, (2) apple varieties resistant to scab; four hybrids show high resistance and have been crossed with Jonathan in the hope of further improving their quality while still retaining disease resistance.

3374. MONIN, A.
Description et identification des variétés des cerisiers. **(Description and identification of cherry varieties.)** [English and German summaries 4 lines each.]
Rev. Agric. Brux., 1951, **4**: 1481-96, illus.
The present confusion of identity of cherries cultivated in Belgium can only be resolved by a detailed study of the varieties. The author details the principles to be followed in identifying cherry varieties. They include habit and vigour of tree, flowering characteristics and especially fruit characters, size, shape, etc. [See also next abstract.]

3375. MONIN, A.
Description et identification des variétés de cerisiers. **(Description and identification of cherry varieties.)**
Bull. Inst. agron. Gembloux, 1951, **19**: 276-326, illus.
Between 200 and 300 varieties of cherry are cultivated in Belgium and there is some confusion in nomenclature. They can best be distinguished by the habit and vigour of the tree, the flowering characteristics and in particular the fruit and stone characters. A description based on the fruits is given of 32 principal varieties.

It covers origin of variety, maturing date, number per kg., shape, size (the length, breadth and width and their comparative relationship), the characters of the distal end, the pistillary point, the suture, the peduncular cavity, the flesh, the juice and the skin, the taste, and the resistance to splitting and rotting and to damage in transport. [The paper noted in Abstract 3374 deals only with methods of identification. This deals with methods more briefly, but provides pomological descriptions.]

3376. AUBIN, L.
Les meilleures variétés de pêches cultivées dans la région parisienne. **(The best varieties of peach cultivated in the Paris region.)**
Jardins Fr., 1952, **6**: 128-36, illus.

In the Paris area plum rootstocks, Damas, Saint Julien, Myrobalan, and sloe, are found best for peaches in moist clayey soils and almond in drier and in calcareous soils. Suitable early varieties, interesting for amateurs but all having the disadvantage of being cling peaches, are May Flower, Earliest of Hale, Vainqueur, Alexander and Amsden. The Paris market being abundantly supplied with early peaches local professional growers are planting more late varieties. A list is given of 15 good moderately late and late varieties that do well in the Paris area. 14 are freestone. Their season is from early July to early October. All grow excellently as espaliers, but the following also do well in the open without support: Hale's Early, Professeur Vilaire, Louis Grognet, Belle Imperiale, Madame Rogniat and Reine des Vergers.

3377. RODIONOV, A. P.
Kiev peaches. [Russian.]
Sad i Ogorod, 1952, No. 6, pp. 18-21, illus.

Peaches are not widely grown in the Ukraine; they have been tried but with little success. Introduced varieties were not sufficiently winter hardy. Trials at the Ukraine pomological institute at Kiev are described for raising varieties which are hardier and so more suitable for such regions, and some are being propagated in various parts of the Ukraine. The characters of five of these varieties are given.

3378. OBERLE, G. D., AND MOORE, R. C.
Peach varieties vary in resistance to frost at blossoming.
Fruit Var. hort. Dig., 1950, **5**: 67-74, bibl. 7.

Observations made at the Virginia Agricultural Experiment Station in 1950 show that there is a distinct variation among peach varieties in the frost resistance of their blossoms. The range extended from complete lack of crop in such varieties as Alberta, Golden Jubilee and Summercrest to sets of fruit requiring thinning in the varieties Veteran, Vedette, Redhaven, Erly-Red-Fre, Colora, Fisher, N.J. 133, N.J. 137 and V.P.I. 8. The probable reasons for this variability are discussed and the use of hardy varieties in breeding programmes is urged.

3379. AGATI, G.
Osservazioni sul comportamento ereditario di alcuni caratteri del pesco. **(Observations on the hereditary behaviour of some characters in peaches.)** [English summary 18 lines.)
Riv. Ortoflorofruttic. ital., 1952, **36**: 3-11, bibl. 19, illus.

Research at Florence University on the hereditary mechanism of four characters in the peach showed that: (1) campanulaceous (nonshowy) are dominant over rosaceous (showy) flowers and the characters are controlled by one pair of genes; (2) in stone-adhesion free is dominant over cling and the character is apparently controlled by one pair of genes. Some fruits which differ in different years in this particular are classified as semi-cling; (3) the relationship between leaf gland type and leaf margin is confirmed; (4) a relationship probably exists between the colour of leaves just before they fall and that of the fruit flesh. Races and hybrids with yellow flesh have deeper yellow leaves than those with white flesh.

3380. CARLONE, R.
Osservazioni su una probabile mutazione gemmaria della varietà di pesco Elberta. **(An apparent bud mutation in the peach variety Elberta.)** [English summary 7 lines.]
Reprinted from *Genet. Agrar.*, 1951, **3**, pp. 12, bibl. 11, illus.

The mutant described preserves its characteristics when propagated vegetatively, but is inferior to the original Elberta.

3381. VERNER, L.
Reine Red, a bud sport of Reine Claude plum.
Fruit Var. hort. Dig., 1951, **6**: 5-6, being *Res. Pap. Idaho agric. Exp. Stat.* **341.**

Reine Red, a red-fruited bud sport of Reine Claude plum, is comparable in quality to its green-fruited parent, and is much more attractive. Fruit of the second generation trees has retained the red colour of fruit on the original sporting branch, and is about 1¼ in. in diameter and 1⅛ in. in length as grown under irrigation in west-central Idaho.

3382. REDŽIĆ, M.
Prilog proučavanju smokava u Crnogorskoj suptropskoj zoni. **(A contribution to the study of fig varieties in the subtropical area of Montenegro [Jugoslavia].)**
Arh. poljopr. Nauk., 1951 (issued March 1952), **4**: 6: 112-39, illus.

Descriptions are given of 31 fig varieties, mostly native, cultivated around Bar in the Montenegro division of Jugoslavia. The areas under cultivation, economic value and physiological characters of the varieties are also noted. D.S.

3383. TABAIN, F.
Prilog proučavanju morfoloških i bioloških osobina naših smokava. **(A contribution to the study of the morphological and biological characters of [Jugoslavian] fig varieties.)**
Rad. poljopr. nauč-Istraž. Ust., Beogr., 1949, **1**: 124-56, illus.

The author presents the results of his study of 23 Jugoslavian fig varieties cultivated on the Adriatic coast, with special reference to their morphological and biological characters. A description of each variety is given, together with information on its mode of fertilization, with a view to facilitating the choice of varieties for cultivation and to ensuring a correct evaluation of their economic value. This study

represents a valuable contribution to the knowledge of native fig varieties of the Jugoslav Adriatic coast.
D.S.

3384. Maroc, Service de l'Horticulture.
Liste des variétés d'oliviers en culture dans les établissements dépendant du Service de l'Horticulture. **(List of olive varieties growing on stations belonging to the Horticultural Service, Morocco.)**
Terre maroc., 1952, **26**: 94-6.
The 92 varieties that now form the collection are listed with their place of origin and the stations at which they are growing.

3385. Ciferri, R.
Elementos para el estudio del origen y evolución del olivo cultivado. **(A basis for the study of the origin and evolution of the cultivated olive.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 185-90, bibl. 9.
The author gives his reasons for thinking that the evolution of the cultivated olive is a special case of introgressive hybridization.

3386. Ciferri, R.
Análisis de las poblaciones del acebuche como método para el estudio de la hibridación introgresiva del olivo. **(Analysis of the populations of wild olive as a method of studying the introgressive hybridization of the olive.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 369-79, bibl. 10.
A method of studying wild olive populations, as a means of determining the evolution of the cultivated olive, is proposed. It involves examination of the following characters: persistence of the juvenile habit, shape of branch sections, spininess of branches, form of juvenile and adult leaves, index of kernel form, roughness of kernel, fruit weight, the ratio weight of fruit/weight of pulp. As an example, these characters are tabulated for the wild olives of 4 districts of Italy.

Propagation and rootstocks.

(*See also* 3477s, 4523.)

3387. Moretti, A.
Portinnesti del pesco, del mandorlo, del susino, del ciliegio e dell'albicocco in Francia e in Svizzera. **(Rootstocks used for peach, almond, plum, cherry and apricot in France and Switzerland.)**
Riv. Fruttic., 1951, **13**: 228-42, bibl. 5, illus.
Seedling rootstocks are still most commonly used for stone fruits, others being employed only under special conditions of climate, soil and cultural technique. The rootstocks most commonly used in France and Switzerland are listed.

3388. Capucci, C.
I port'innesti delle piante arboree da frutto nell'Emilia. **(The fruit tree rootstocks of Emilia.)**
Riv. Fruttic., 1952, **14**: 32-45.
The stocks most commonly used in Emilia for apple, pear, peach, plum, cherry and apricot are briefly dealt with.

3389. Dylevskiĭ, A. A.
Local rootstocks for fruit trees in the zone of the main Turkmen canal. [Russian.]
Sad i Ogorod, 1952, No. 7, pp. 25-9, illus.
The zone of the main Turkmen canal comprises various types of soil, including wide deserts and semi-deserts with sandy soil. The soil of the oases contains salt and is also characterized by persistent water tables. The author, working at the Samarkand fruit-breeding station, has examined a number of local drought-resistant and salt-tolerant deciduous fruit forms, in particular an apple variety Baba-arabic, the characters of which are described. It is specially suitable as a dwarfing stock under those climatic conditions. Another suitable apple rootstock is a form of *Malus pumila*. Other varieties are named, among them one as a rootstock for European pears, and another for European plums.

3390. Kasjjanenko, A. I.
Rootstocks for fruit trees in the southern Ukraine canal zone. [Russian.]
Sad i Ogorod, 1952, No. 7, pp. 29-31, illus.
Whereas formerly in the southern Ukraine deep rooted fruit tree rootstocks were recommended, now, with the construction of the canal for serving the Kharkov hydroelectric station, shallower rooted types can be used for irrigated areas. Data for two apple varieties on five types of rootstock, nos. II, III, V, VIII and X, are tabulated.

3391. Karnatz, H.
Welche Sämlingsunterlagen haben sich bisher in der Baumschule am besten bewährt? **(The behaviour of seedling rootstocks in the nursery.)**
Dtsch. Baumsch., 1952, **4**: 96-8.
Notes are given on the germinating capacity of seed and first year growth of some important pome and stone fruit rootstocks used in Germany.

3392. Karnatz, H.
Einige Ratschläge zur Stratifikation des Kernobstes. **(Advice on the stratification of pome fruit seed.)**
Mitt. ObstbVersuchsrings Jork, 1952, **7**: 31-2.
To ascertain the time required for the successful stratification of pome fruit seed, which is stated to vary from year to year, it is suggested that stratification and subsequent germination trials should be carried out, beginning early in October. Another method of ensuring good seed for sowing is stratification at the usual time, viz. early January; when signs of premature germination appear the seed should be cold stored till required.

3393. Karnatz, H.
Ergebnisse von Stratifikationsversuchen bei Kernobstsamen. **(Results of stratification trials with pome fruit seeds.)**
Dtsch. Baumsch., 1952, **4**: 119-25.
The author recommends the stratification of slow and medium germinating apple and pear seeds by the middle of January and of fast germinating seeds at about

the end of February. When desired all seeds can be stratified at the same time (early), and those germinating prematurely kept at −1 to −2° C. till required for sowing. Soaking of seed before stratification was found advantageous, and stratification in sand was better than in ground peat.

3394. KUZNECOV, M. D.
The use of nutrient cubes for raising fruit tree seedlings.
Sad i Ogorod, 1952, No. 4, pp. 15-16, illus.

An experiment is described in which apple seedlings, raised in nutrient "cubes", consisting of hexagonal blocks of soil containing peat and cow-dung so that they could be put out in the nursery without disturbing the roots, were compared with seedlings raised in the ordinary way and transplanted. The root systems and resulting growth were much better in the seedlings raised in the "cubes".

3395. SPINKS, G. T.
Trials of clonal apple rootstocks selected from "free" and "crab" seedlings. IV. Performance when worked with four scion varieties and grown as standard trees at Long Ashton.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 28-33, bibl. 4.

Mean total crops per tree for 22 or 23 years and mean trunk girths at 23 years are recorded for trials, the layouts of which were described earlier [see *H.A.*, 16: 1806]. Rootstock M. XII has produced the largest trees and heaviest crops, and G8 has also been generally satisfactory, though not superior to M. XII, as a stock for standard trees. Stocks F11 and G7 have proved unsuitable for standards but may be useful as stocks for bush trees. None of the other stocks can be recommended for general use.

3396. PINTO CESAR, H.
A nespereira e sua enxertia. **(The Japanese loquat and methods of grafting it.)**
Rev. Agric. Piracicaba, 1951, **26**: 373-6.

Descriptions of 5 good varieties of loquat (*Eriobotrya japonica*) are followed by notes on rootstocks and grafting. Rootstocks of seedling loquat produce large, long-lived trees but the fruits are unsatisfactory. Hawthorn (*Crataegus oxyacantha*) rootstocks produce small, shorter-lived trees that bear regularly and heavily and have fruit of much better size and quality. On quince stocks the trees are dwarf, very productive, come into bearing in the second year, and bear large, high quality fruit. One-year-old rootstocks should be used for grafting, and scion wood of 12-18 months, not more than 20 cm. long, with or without a terminal bud. In the state of São Paulo, Brazil, July and August are the best months for grafting, September-November for budding in the growing season and April-May for dormant budding.

3397. MANARESI, A.
Osservazioni sui soggetti usati per l'innesto degli alberi da frutto nell'Emilia e nella Romagna. II. Il susino. **(Fruit tree rootstocks used in the Emilia and Romagna districts. 2. The plum.)**
Riv. Fruttic., 1951, **13**: 157-66, bibl. 8, illus.

Observations extending over 10 years on rootstocks used for European and Japanese plums indicate that: (1) *Prunus cerasifera* var. *myrobalana* rootstocks are the most commonly used. The usual method is grafting but sometimes buds of the current year's growth are used on one-year-old stocks; (2) on *P. spinosa* the plants are smaller, less vigorous and lower-yielding but live 40 years; the stock is prone to suckering; (3) peach, almond, *P. marianna* and *P. davidiana* give good results but are little used; (4) apricot, common plum and *P. insititia* are rarely used.

3398. VAN CAUWENBERGHE, E.
Vermenigvuldiging van geïdentificeerde pruimenonderstammen door stekken. **(Propagation of identified plum rootstocks by cuttings.)**
[*Publ.*] *Rijkstuinbouwschool Vilvorde, Belgium*, 1950, pp. 31, illus. [received 1952].

A series of experiments carried out at the State Horticultural School at Vilvorde on the propagation of plum rootstocks by cuttings are reported. The following are among the more important results obtained. *Summer cuttings* did not on the whole give commercially satisfactory results. Long summer cuttings (20 cm.) rooted slightly better than short ones (10 cm.), and those taken during leaf fall were better than those taken earlier. The different stocks tested showed great differences in rooting ability, the highest percentage of rooting (61) being shown by St. Julien A cuttings taken in the first half of November. *Root cuttings* in the open ground gave 22·1% better rooting than those in a closed frame. Of the 15 stocks tested, Common Mussel, B.L.S. Mussel, St. Julien A, C and G and Kroosjes gave the best results from root cuttings. Treatment with growth substances (Stimroot) reduced rooting in the open but slightly improved it in the frames. *Winter cuttings*. Etiolated shoots from the layer beds rooted much more readily than non-etiolated cuttings, the average % rooting of the former being about 77. Long cuttings (35 cm.) rooted better than short cuttings (22 cm.). *Growth substance treatment* with Stimroot (α-naphthylacetic acid and β-indolebutyric acid) and DPA (dichlorophenoxyacetic acid) made very little difference to rooting, the former being slightly advantageous and the latter slightly detrimental. The optimum time of treatment requires further investigation. *Quince A pear rootstock* cuttings taken at leaf fall gave almost no rooting even when treated with growth substances. Cuttings taken in March with a heel gave 87% rooting compared with 39% without a heel. Growth substance treatment did not increase rooting.

3399. CRANE, J. C., AND MALLAH, T. S.
Varietal root and top regeneration of fig cuttings as influenced by the application of indolebutyric acid.
Plant. Physiol., 1952, **27**: 309-19, bibl. 10, illus.

Experiments were conducted at the University of California to determine the relative rate and degree of root and top regeneration in tip cuttings of 4 common varieties of fig (in all of which unassisted propagation from cuttings presents no difficulty), and their response to various concentrations of indolebutyric acid (IBA). Treatment resulted in injury to 3 of the varieties and increased regeneration in the fourth. The order in which

the varieties stood for degree of injury from identical concentrations of IBA was the same as that of untreated cuttings for rate and degree of root and top regeneration. Thus the greater the natural potentialities a variety had for regeneration the greater was the injury resulting from application of the hormone.

3400. INFORZATO, R.
O emprêgo de hormônios no enraizamento de estacas de amoreira. (**The use of hormones to induce rooting in mulberry cuttings.**) [English summary 4 lines.]
Bragantia, 1950, **10**: 385-7, bibl. 2, illus. [received 1951].

The mulberry variety Catania does not normally root well from stem cuttings. In tests with several hormones to stimulate rooting, Seradix B, Nos. 2 and 3, gave the best results.

3401. LAUDANSKI, F.
Étude préliminaire de quelques porte-greffes et sélections du mûrier. (**A preliminary study of clonal mulberry rootstocks.**)
Progr. agric. vitic., 1952, **137**: 341-7, bibl. 4.

While good sericultural varieties of mulberry that propagate well from cuttings are now being bred, multiplication is still mainly by grafting good sericultural varieties onto stocks of non-sericultural varieties which propagate well from cuttings. Experiments were made at Alès Sericultural Research Station with stocks from clones in the collection at the National Agricultural School, Montpellier. They were Tonkin (*Morus rotundiloba*), Lhou (*M. alba Lhou*), multicaule plane (*M. multicaule planifolia*), multicaule bulle (*M. m. cucullata*) and aureofolia (*M. m. aureofolia*). Tonkin cuttings struck much better than the others and displayed greater vigour in the nursery. Multicaule bulle showed promise and will be further tested. Among hybrids bred at the Station 11A and 14A appear to be as good as present rootstocks.

3402. REBOUR, H.
Greffage des oléastres ou plantation? (**Grafting wild olives *versus* planting.**)
Fruits et Prim., 1951, **21**: 327-9, illus.

The grafting of wild olives has contributed to the prosperity of many north African regions, and its advantages are discussed. The trees, however, must be well treated for good results. It is pointed out that, with tractors replacing horse cultivation and with the use of cover crops, tall trunks are not now necessary, and this reduces the time required for the trees to come into bearing.

3403. ELANT, H., AND PERROT, J.
La production des oliviers par boutures. (**The propagation of olive trees by cuttings.**)
Rev. agric. Afr. N., 1952, No. 1701, reprinted in *Fruits et Prim.*, 1952, **22**: 118-20.

100,000 olive trees are propagated annually by cuttings for use in the Beni Amir irrigation area. Thin-barked branchwood 6-15 cm. in diameter is used and the cuttings are 25 cm. long. Cuttings 6-9 cm. in diameter are planted vertically or preferably at 45°. Thicker ones are placed horizontally in single lines at the base of furrows 40 cm. deep and are covered with 2 cm. soil. Irrigation is carried out immediately after planting and subsequently at intervals. In June the shoots are earthed up, the furrows being shifted to a permanent position between the lines. Root development is not vigorous until the third year. Normally only the strongest shoot is retained but 2 are kept on horizontal cuttings if well spaced. On lifting, plants are separated from their mother cutting whenever possible. Before plants are issued from the nursery the side branches below a point 40-50 cm. above ground level are cut back, the upper branches being left to form the crown.

3404. MARINUCCI, M., AND JACOBINI, N.
Afinidad e intensidad metabólica en el olivo injertado. (**Affinity and rate of metabolism in the grafted olive.**)
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 191-6, bibl. 5, illus.

In experiments to determine the relationship between stock/scion affinity in olives and rate of metabolism of the trees (determined by O_2 and CO_2 consumption) the variety Moraiolo was used on the following rootstocks: seedling Moraiolo, seedling Frantoio and wild olive. The results showed that the rate of metabolism of Moraiolo was markedly higher on wild olive than on Frantoio or Moraiolo stocks. It was also higher than that of the ungrafted wild olive. Growth of the trees was best where the rate of metabolism was highest.

3405. PADFIELD, C. A. S.
Trials with various grafting materials.
Orchard, N.Z., 1952, **25**: 3: 4-7, illus.

Although good " takes " were obtained [apparently in apples] with all the materials tested except one, those of the bituminous group were found to be the most satisfactory. They maintained a durable permanent cover over the cut surfaces and produced the most vigorous scions with no damage to tissue. The addition of hormones increased callus formation but did not justify the extra cost, and sometimes they were injurious. —Fruit Research Station, D.S.I.R., New Zealand.

Pollination and flower fertility.

(*See also* 3477r.)

3406. EHLERS, H.
Untersuchungen zur Ernährungsphysiologie der Pollenschläuche. (**A study of the nutritional physiology of pollen tubes.**)
Biol. Zbl., 1951, **70**: 432-51, bibl. 39.

The pollen tubes of 14 angiosperm species were found to develop to a length sufficient for fertilization in artificial media containing only distilled water and traces of boric acid. This proves that some angiosperm pollen grains are capable of producing fully grown tubes from their own reserve materials independent of nutrients provided by the culture medium or the style tissue. The pollen tubes of many other species, which did not reach full length in culture media but did not benefit from the addition of various sugars, appear to be equally independent of outside nutritional sources. A third group of pollen grains only developed fully grown tubes if sugar and other nutrients were added to the medium. However, in this case the sugar need not necessarily be a nutrient, it may merely change

the medium in a manner that promotes tube growth. In fact, observations on pollen tube growth in artificial media and in *Tradescantia* and *Amaryllis* styles make it probable that the reserve materials of the pollen grain are the tube's only source of nutrients. Pollen grain germination and tube growth were generally stimulated by boric acid.

3407. Antles, L. C.
Review of commercial pollen storing, shipping and research.
55th A.R. Vt St. hort. Soc. 1951, pp. 18-29, bibl. in text.

At the laboratory of the Fruit Tree Pollen Supplies Co., Wenatchee, Washington, the viability of stored pollen was increased from 35 to 70% by storage in a desiccator with sulphuric acid. Further studies have shown that deep freeze temperatures as low as 70° F. below zero preserved the life of pollen practically intact. To bring about better results in transport the use of dry ice and its carbon dioxide residues were tested and found to enhance the life of pollen grains. Of the materials tried as diluents for dusting pollen onto the trees lycopodium was the most promising. The desirable effect of some micro-nutrients, particularly boron, on pollen germination is noted.

3408. Gillard, A.
Fructiculture et apiculture. **(Fruit-growing and bee-keeping.)** [English and German summaries 11 lines each.]
Rev. Agric. Brux., 1952, **5**: 23-39, bibl. 31, illus.

The importance of collaboration between fruitgrowers and beekeepers is stressed. Rates of fruit setting and seed number/fruit weight ratios are quoted to show the importance of adequate fertilization. Flight guidance by means of scented substances and pollen cages are recommended as artificial aids to efficient pollination.

3409. Mommers, J.
Honeybees as pollinators of fruit trees.
Bee World, 1951, **32**: 41-4, bibl. 47.

The subjects dealt with in this short review article article are the honey-bee's role as a pollinator and the factors affecting pollination, including the number of bees and other insects, species differences, weather, disposition of colonies, foraging behaviour, and the problems of cross pollination.

3410. Passecker, F.
Untersuchungen über die Befruchtungsbiologie von Tiroler Obstsorten. **(Pollination biology of Tyrolean fruit varieties.)** [English and French summaries 3 and 4 lines respectively.]
Mitt. Klosterneuburg, 1952, **2**: 111-18, bibl. 8.

The best pollinators for self-sterile varieties of apples, cherries and plums in the Tyrol have been ascertained by careful long term experiments and are here listed.

3411. Petrahilev, I. M.
A case of abnormal apple flowers. [Russian.]
Bot. Žurnal, 1951, **36**: 305-6, illus.

Abnormal flowers of the apple variety Papirooka were observed in the spring of 1949 in the garden of the Minusinsk horticultural research station. Such flowers had a large number of petals arising from modified reproductive organs, and the sepals were replaced by leaves of various sizes. They are described in detail. They did not form fruit.

3412. Evreinoff, V. A.
Osservazioni bio-pomologiche sul pesco. **(Biological studies on the peach.)**
Riv. Fruttic., 1951, **13**: 167-73.

Flower abnormality (defective stamens, pollen or pistil) is an important cause of reduced yield in peaches. Investigation showed it to be due to weather conditions before flowering and particularly to low temperatures in the preceding 3-4 weeks. In the less fertile varieties flower abnormality is regularly displayed and cannot be corrected. In the more fertile varieties it occurs only under certain conditions of environment and climate and can be overcome by manuring when the chief cause is low temperatures.

3413. d'Almeida, F. J.
Esterilidad y fertilidad de los olivos. Polinización. **(Sterility and fertility in olives. Pollination.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1: pp. 246-9, bibl. 2.

The causes of sterility in olives are analysed under the headings: meteorological, genetical, physiological and nutritional. The possibilities of overcoming each type are estimated.

3414. Riera, F. J.
Las formas de la esterilidad en el olivo morfológica y citológicamente condicionadas. **(Morphologically and cytologically conditioned forms of sterility in the olive.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 394-422.

Following some general remarks on the morphology of female sterility, studies on ovary and microspore sterility are reported. It is concluded that female sterility is generally morphologically conditioned, the result of rudimentary ovaries, styles or stigmas, whereas male sterility, shown in non-functional stamens, is of cytogenetical origin. Female sterility is relatively constant, within limits, for each variety. Within these limits it can be affected by cultivation, manuring or pruning practices. Male sterility affects all the flowers of an inflorescence and is constant in all the inflorescences of a plant. It remains unaffected by cultivation practices. Structural modifications of male sterile flowers can only be achieved by genetical means.

3415. Marcucci, G. B.
El cultivo del olivo. Recientes contribuciones al conocimiento de la biología floral del olivo. Exposición cronológica de los resultados de unas investigaciones. **(Cultivation of the olive. Recent contributions to knowledge on the floral biology of the olive. A chronological account of the results of some investigations.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 341-51, bibl. 15, illus.

Nutrition is not in itself capable of inducing differentiation of flower buds in the olive if the cryptophase of flowering has not already taken place during the dormant period. On the other hand the stimulation of the cryptophase is not sufficient to ensure production unless the nutritional conditions are favourable at the times of the differentiation of the meristems, the development and maturation of the floral organs, and the development and maturation of the fruits. Where nutrition is inadequate, sterility will occur proportionally, and extreme cases may result in complete failure to flower or complete ovary abortion.

3416. RIERA, F. J.
Polinización y fecundación en olivicultura. **(Pollination and fertilization in the olive.)** *13th Congr. int. Oleicult. 3. Actas Oleicult. 1950*, Madrid, Vol. 1, pp. 440-89, bibl. 3, illus.

The first part of this paper deals with such subjects as fruit formation, parthenocarpy and apogamy, polyploidy, sexual incompatibility, nutrition and fertilization, and arrangement of pollinators in the orchard. The results of extensive pollination trials are tabulated. In the second part are given results of trials on pollen germination, and information on the techniques of emasculation, pollen collection, artificial pollination and bagging.

3417. AGATI, G.
Sobre la germinabilidad del polen del olivo. **(The germination capacity of olive pollen.)** *13th Congr. int. Oleicult. 3. Actas Oleicult. 1950*, Madrid, Vol. 1, pp. 283-92, bibl. 14.

A brief review of the literature is followed by a report of germination trials on olive pollen carried out at the Institute of Tree Crops, University of Florence. The results showed consistently that pollen of Moraiolo and Frantoio, the 2 most important varieties of Florence, have a very poor germination capacity. Data are given on the value of the various germination media used.

3418. RUSSO, F., AND SPINA, P.
Indagini sulla formazione delle cosidette pseudodrupe nell' olivo. **(Investigations on the formation of the so-called pseudodrupes in the olive.)** [English summary 10 lines.] *Ann. Sper. agrar.*, 1952, **6**: 101-18, bibl. 22, illus.

Research was conducted on olive pseudodrupes at Acireale Experimental Station, Sicily. They develop parthenocarpically from unfertilized ovaries, the growth of the pollen tube ceasing before the ovule is reached, and they are commonest in self-fertile varieties. Their incidence can be minimized by distributing pollinators at suitable intervals in the orchard and by pruning to permit free access of pollen to all parts of the trees.

3419. ELANT, H., AND PRALORAN, J. C.
Contribución al estudio de la floración de los olivos indígenas de Marruecos. **(A contribution to the study of flower morphology in the native olives of Morocco.)** *13th Congr. int. Oleicult. 3. Actas Oleicult. 1950*, Madrid, Vol. 1, pp. 250-79, illus.

The native olive of Morocco, known as Picholine marroqui, often produces poor crops. A study was made to determine whether this was partly due to the morphology of the flowers. A survey of an old orchard at the Marrakech Regional Horticultural Station showed that the percentage of normally constituted flowers was higher on the south side of the trees than on the north. The tree population was not very homogeneous with respect to flower constitution. In an old commercial orchard at Fez, half of which was bearing well and the other half poorly, no correlation was found between flower constitution and orientation, but trees in the productive half had 22·8% normally constituted flowers whereas those in the unproductive half had only 4·3%. The average percentage varied significantly in the 3 years under study. Dry, hot weather just before flowering favoured the formation of normally constituted flowers, as did low rainfall during winter, although it is considered that a more detailed study of the distribution of the rainfall would be valuable. It is concluded that this olive should be propagated only from trees showing a high proportion of normally constituted flowers.

3420. BRICHET, J.
L'" avortement floral " de l'olivier, cause principale de la décadence de l'oliviculture extensive. **(Flower abortion, the principal cause of the decline of olive-growing [in North Africa].)** *Fruits et Prim.*, 1951, **21**: 396-7.

Most cultivated olive trees in French North Africa regularly suffer flower abortion through food and water shortage due to inadequate cultural care and bad location. A radical change in cultural methods is recommended.

3421. U.N.S.E.A. (BENEDETTI, —.).
Investigaciones sobre la biología floral de algunas variedades de olivo de los Abruzos, Puglie, Calabria y Sicilia. **(Investigations on the floral biology of some olive varieties of Abruzzi, Puglia, Calabria and Sicily.)** Abstract in *13th Congr. int. Oleicult. 3. Actas Oleicult. 1950*, Madrid, Vol. 1, pp. 393.

A series of extensive investigations on the self-fertility of 34 varieties of olive in Italy have shown that the following are self-sterile: Dritta, Olivoce, Castiglionese, Indosso, Peranzana, Uccellina, Ottobrarico, Rizzo, Dolce, Baresana, Grossa di Cassano, Minuta and Cassanese. Observations were made on the morphology of the inflorescences and the flowers.

3422. ZANINI, E., AND BALLATORE, —.
Autoesterilidad y autofertilidad de las variedades del olivo en Sicilia. **(Self-sterility and self-fertility in the olive varieties of Sicily.)** *13th Congr. int. Oleicult. 3. Actas Oleicult. 1950*, Madrid, Vol. 1, pp. 367-8.

Studies made at the Institute of Tree Crops, University of Palermo, showed that the variety Leccino is self-sterile, while Ogliarola, Caloria, S. Agatese and Verdea are self-fertile, and Ascolana is partially self-fertile. Tests were also made on the germination of olive pollen on different pollen media. The percentage germination obtained for different varieties varied with the medium used, and it is considered that the problem of the most suitable medium needs careful study. Pollen of Leccino

did not germinate on any of the media used, a fact which suggests a correlation between fertility and pollen germination.

Growth phenomena.

3423. PASSECKER, F.
Geschlechtsreife, Blühwilligkeit und Senilität bei holzigen Gewächsen. **(Sexual maturity, readiness to flower and senility in woody plants.)**
Züchter, 1952, **22**: 26-33, bibl. 23, illus.

In this article the author more or less recapitulates his theory of phase development as elaborated in earlier papers [see *H.A.*, 14: 1505 and 18: 1625]. Some data from new experiments indicate that roots show a behaviour similar to that of shoots in that the oldest parts (close to the stem) remain in the juvenile phase, while the younger parts (at a greater distance from the stem) are in the mature phase. From a total of 62 root cuttings of myrobalan, quince and apple taken from root pieces close to the stem 18 formed shoots, whereas only 3 shoots were formed by cuttings from the mature zone of the root. In a discussion on the physiological differences between fruit trees in the juvenile and mature phase it is mentioned that young apple seedlings are more liable to aphid infestation than varieties, while cuttings from juvenile forms are more resistant to certain fungi than cuttings from mature forms. High temperatures and a generous supply of nutrients are some of the factors that accelerate the transition from the juvenile to the mature form. In this connection Mičurin is quoted as achieving a rapid transformation of almond seedlings by supplying potassium permanganate. In passing, the view is endorsed that the earthing up and cutting back of stoolbeds is responsible for the preservation of rootstocks in the juvenile form. In a tree's development the mature phase is eventually superceded by the senile stage which precedes its death. The degeneration of a vegetatively propagated variety is interpreted as a phenomenon of senescence and its rejuvenation is considered possible by selecting as budwood shoots of very old trees which issue from the bottom part of the stem. [The possible influence of virus infection on degeneration is not mentioned.] Growing points are not regarded as exempt from aging, as the tissues they produce conform to the developmental stage of any particular part of the tree. Finally the author discusses the ecology of shade leaves and spines in juvenile trees. Thornless blackberry varieties are, according to him, an advanced stage of the mature form.

3424. KENKNIGHT, G.
Germination inhibiter in wood and bark of peach and wild *Prunus*.
From abstr. in *Phytopathology*, 1952, **42**: 285.

Seeds of squash, cantaloupe, sweet corn, cabbage, turnip, blue lupin, and choke-cherry on damp filter paper over wet peach-wood or peach-bark sawdust in Petri dishes either completely failed to germinate or germinated after several days' delay, whereas in parallel controls (without sawdust) the seeds germinated well. Filtered water extracts of 1 g. of peach-wood or peach-bark sawdust in 10 c.c. of tap water used to wet filter paper for germinating seed also reduced and retarded germination. The inhibiting character of the extract persisted after dilution with water, but the degree of dilution inhibiting germination varied considerably from one experiment to another. It was correlated somewhat with seed size, being greatest with small seeds. The germination-inhibiting substance appeared to be present in stem and root wood and bark of both apparently normal and phony (virus) peach and in root wood and bark of *Prunus angustifolia* and *P. serotina*.

3425. MAZZOLANI, G.
Algunas observaciones sobre el desarrollo de las yemas de olivo ("*Olea europea*"). **(Some observations on the development of olive buds.)**
Olivicultura, 1951, No. 5, from abstr. in *Bol. oleic. int.*, 1951, No. 3, pp. 69-70.

The development of buds in the olive is described in detail. Differentiation between wood, leaf and flower buds is difficult in spring. In the author's opinion the existence of terminal branches with leaves, flowers and terminal inflorescence is not due to "mixed buds" (as some think) but to the existence in axillary buds of other tiny buds which may produce either wood or inflorescence.

Nutrition, soil management and irrigation.

(*See also* 4538.)

3426. TOENJES, W.
Annual orchard cover crop tests in Michigan.
Quart. Bull. Mich. agric. Exp. Stat. 1952, **34**: 370-82, illus.

Of the various plants tested, amber sorghum, sudangrass, German and Japanese millets, in the order named, were best adapted for annual cover crop purposes in young Michigan orchards. Sowing dates suggested for the different parts of the state vary around early July. For bearing cherry orchards in the northern areas, post harvest seeding of mixtures of oats and field peas, or winter grains were the most satisfactory. In mature plum and cherry orchards winter rye and in apple and pear orchards winter wheat or rye sown from mid August gave the best results. Complete fertilizer application at the time of seeding is thought advisable.

3427. VAN STUIVENBERG, J. H. M., AND POUWER, A.
Enkele gedachten over voedingsevenwichten van vruchtbomen. **(Some thoughts on nutritional balances in fruit trees.)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1952, **15**: 80-89, bibl. 8.

Nutrition balance in fruit trees is discussed in relation to leaf analyses and to the relation between condition of the soil, leaves and yield. Leaf analyses showed that the ratio of K and Mg is very important with regard to deficiency symptoms, the most favourable ratio being about 10 : 1; Mg deficiency became noticeable when the K/Mg ratio was about 20 : 1, and K deficiencies when the ratio was about 5 : 1. Disorders developing during storage (bitter pit in the apple variety Notaris, Jonathan breakdown, and internal browning in Belle de Boskoop) are usually associated with very high K content in the leaves.

This high K content is presumably due to a disturbance in the utilization of growth regulating substances, associated with a shortage of boron and perhaps of other elements.—Instituut voor Tuinbouwtechniek, Wageningen.

3428. OSTROUHOV, A. M.
Trials for the control of biennial bearing in apples. [Russian.]
Sad i Ogorod, 1952, No. 4, pp. 12-15.

Biennial bearing is discussed with regard to the differentiation of the fruit buds, which takes place only when the percentage of protein N (in relation to the total amount) in the fruit-producing branches is above 70-80% while the concentration of the cell sap is increasing. In trees which bear no flowers, or only a moderate number, the percentage of N accumulating as protein in the phloem of the branches and the concentration of cell sap increases from the flowering period to the time of differentiation of the fruit buds. Conversely in trees flowering freely it decreases, because it is used up in the development of the flowers and fruit. The application of N fertilizers will raise the percentage of protein N in the concentration of cell sap, and consequently the carbohydrate concentration increases, and this has a favourable effect on the differentiation of the flower buds. If the N fertilizer is applied after the June drop in on-years, and before flowering in off-years, biennial bearing will be less marked.

3429. BOULD, C., AND TOLHURST, J.
Nutrient placement in relation to fruit tree nutrition. III. Nitrogen fertilization of apple with foliage sprays of urea. Progress report.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 49-53, bibl. 6.

Urea sprays at 1% concentration (10 lb. per 100 gal.) caused no damage to apple leaves when applied at petal-fall and later. Treatments had no effect on leaf nitrogen and yield of fruit during the first season. This was due to the general high level of nitrogen in all the trees. During the second year treatments had a significant effect on the leaf nitrogen status. The greatest effect was produced by the petal-fall spray. A significant positive correlation was shown to exist between leaf nitrogen status and yield of fruit in the first season. [From authors' summary.]

3430. MOON, H. H., REGEIMBAL, L. O., AND HARLEY, C. P.
Does nitrogen affect color in red sports?
Fruit Var. hort. Dig., 1951 (issued Jan. 1952), **6**: 36.

A note indicating that N treatment does not affect colour development in red apple sports, even when applied at rates seriously retarding the colouring of standard varieties.

3431. BARKER, B. T. P., NICHOLAS, D. J. D., AND PLANT, W.
Studies on cider sickness. III. The effects of tree injection with molybdenum on the composition of apple juice and its susceptibility to cider sickness.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 176-87, bibl. 2.

The juice of apples on branches injected with sodium molybdate showed an increase in Mo in the year of injection and a further increase in the following year. Fruit on untreated branches of an injected tree showed no increase in Mo in the first year but an increase in the second year. The responses of juices with both high and low Mo contents to the sickness bacillus were determined in both fresh juice and juice that had undergone primary natural yeast fermentation.

3432. BEATTIE, J. M., AND JUDKINS, W. P.
Status of Ohio peach trees with respect to certain plant elements.
Res. Circ. Ohio agric. Exp. Stat. **17**, 1952, pp. 11, bibl. 5, map.

Composite foliage samples of Halehaven and Elberta peach trees, taken from 22 commercial Ohio orchards in July 1948, were analysed for total quantities of 7 essential nutrient elements. Wide variations were found in the concentrations of all the elements. This is thought to be due to differences in environmental and cultural conditions. The use of complete fertilizers was of doubtful value in raising the N and K status of the trees above that obtained with N fertilizers alone. Over 10% of the orchards surveyed produced foliage containing deficiency concentrations of K. Moderately heavy applications of K fertilizers are needed to raise such trees from the deficiency level. The use of complete fertilizers containing minor elements was of doubtful value in raising the minor element status of the trees. There was no evidence that any of the trees sampled needed additional boron, iron or manganese. Halehaven showed a higher foliage content of N, and a lower content of Ca and K than Elberta. The mean foliage concentrations of each of the 7 elements determined are proposed as useful values for diagnosing the nutrient status of these peach varieties.

3433. KEATLEY, J.
Nitrogen is important. Benefits to peach crops.
Fruit World, Melbourne, 1952, **53**: 2: 25.

Fertilizer trials begun in 1944 in which N, NP, NK and NPK were applied at various levels, in addition to 2 cwt. superphosphate per acre each autumn for the cover crop, indicated that suitable treatment is (1) up to 6 lb. sulphate of ammonia per tree, half just before bud burst and half 6 weeks before harvest (2) 4 lb. superphosphate per tree in spring (in addition to the cover crop dressing); (3) turning-in of the cover crop 2-3 weeks before flowering.—Tatura Res. Stat. Victoria.

3434. GOUDIE, A. G.
Irrigating orchard soils.
Fruit World, Melbourne, 1952, **53**: 2: 21.

Irrigation experiences on the rather heavy peach soil of the Tatura Research Station, Victoria, included the compacting of the soil due to clean weeding and the subsequent improvement of permeability by the growing of cover crops.

3435. CAPUCCI, C.
Osservazioni sull'effetto dell'irrigazione dei vivai sul successivo sviluppo a dimora nelle piante di *Acer campestre* e di pero. (**A study on the effects of nursery irrigation on the later development of *Acer campestre* and pear.**) [English and French summaries 8 lines each.]
Riv. Fruttic., 1951, **13**: 213-20.

The effect of nursery irrigation on the development and productivity of Williams' pears on seedling pear rootstocks after planting out was studied in Emilia for 7 years. Plants raised in dry nurseries showed faster growth in the first years, but later the rate became almost the same as that of plants raised in irrigated nurseries. The yield of fruit was almost the same in both cases. [See also *H.A.*, 17: 1956.]

3436. Hendrickson, A. H., and Veihmeyer, F. J.
Prune orchard irrigation.
Calif. Agric., 1952, **6**: 6: 10-12, illus.

Five irrigation treatments were applied to French prune trees when 10 years old and for 16 years thereafter: A, 4 or 5 irrigations each of 7·5 acre inches, B, 3 irrigations, C, 2 irrigations, D, none and E, one, after harvest. The soil was a Yolo loam with a field moisture capacity of about 22% and a permanent wilting percentage of 11%. Growth and yield records indicate that treatment B was an adequate irrigation programme; this represented 3 applications between June and September made when the soil moisture in the top 3 ft. reached the permanent wilting percentage. Trees with treatment A, however, made rather more growth, especially in the early stages. The trees in all treatments seemed to be in their prime during the 10-year period from 15 to 24 years old, and thereafter both yield and growth declined.

3437. Ortega Nieto, J. M.
La vecería del olivo y el agua en tres experiencias de poda y fertilización del suelo. **(The relationship between biennial bearing of olives and water supply, investigated in 3 pruning and fertilizer experiments.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 204-25, bibl. 7.

Three preliminary experiments on nitrogen fertilizing, green manuring and pruning in unirrigated olive plantations are used to demonstrate the importance of studying the interrelationship of a complex of environmental factors, rather than the effect of a single factor in isolation, and to determine suitable experimental methods. It is concluded that factorial experiments must be used to separate the effects of pruning and water supply from those of the other experimental treatments, both in irrigated and unirrigated plantations. The effects of green manuring should be studied in relation to type of cover crop and spacing.

3438. Castorina, S.
Investigaciones sobre la nutrición y fructificación del olivo. **(Investigations on nutrition and fruiting in olives.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 380-92, bibl. 7.

Nitrogen manuring experiments were carried out on several varieties of olives for 2 years at the Pescara Experimental Station for Olive Culture, Italy. All varieties were given superphosphate in late autumn and various forms of nitrogen in either late autumn or spring. The percentage fruit set was highest when nitrogen was applied as calcium cyanamide in late autumn or as ammonium nitrate in April. In general the N content and concentration of sap in the leaves were higher at the time of flowering than when the fruits were swelling. With the strongly vegetative and rather unproductive variety Cucco, however, the N content and concentration of the sap were higher in summer than in spring, and were in all cases higher than those of the very productive variety Dritta. It is suggested that the N in the sap, which had not been used up for fruit formation during summer, was at a sufficiently high level in autumn to favour the formation of wood buds. Nitrogen fertilization and pruning should therefore be strictly limited. Another exception to the general decrease in sap concentration during fruit formation was seen in the plots fertilized with calcium cyanamide in autumn; in this case, however, N content fell to the normal level. This is taken as an indication of the nutrient status and vigour of the trees, showing that they would bear well the following year without further applications of fertilizer.

3439. Marimpietri, L.
Reacción, calcio y desarrollo del olivo. **(Soil reaction and calcium in relation to development of the olive.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, 197-8.

Trees of the olive variety Frantoio were planted on the acid soil (pH 5·2) of the Ariccia Valley which has a low active lime content (3·2 mg. per 100 g. soil). Before planting, the soil had been treated with (a) sulphuric acid to reduce the pH to 4·1, (b) calcium sulphate to reduce the pH to 4·0, and (c) lime to raise the pH to 6·8. The amount of growth (increase in weight) made by the trees on the different plots during 2 years was compared. Increase in weight on the plots treated with sulphuric acid was only 82%, whereas on plots (b) and (c) it was 592% and 532% respectively. These results show that available calcium is more important for the growth of olives than soil reaction.

3440. Favilli, R.
Sul valore fertilizzante dell' *Ulex europaeus* L. **(On the fertilizing value of *Ulex europaeus* L.)**
Esper. Ric., 1948, **3** (n.s.): 77-86, from abstr. in *Soils and Ferts*, 1952, **15**, No. 1078.

Gorse is successfully applied in Italy as green manure, mainly to olives, at the rate of 15-35 kg. per tree annually or 50-120 kg. every three years. The green plant contains more organic matter (51·3%) and N (0·84%) than the common legumes and its ash is high in Mn (0·015%).

Pruning and ringing.

3441. Ellenwood, C. W.
Power pruners.
Ohio Fm Home Res., Jan.-Feb. 1951, p. 12, from abstr. in *Agric. hort. Engng Abstr.*, 1951, **2**, No. 894.

Data obtained from comparative tests between machine pruning and hand work indicated that considerable time can be saved by the use of power pruners. With hand pruning 42 minutes were required to remove 100 lb. of brush from trees, while the same amount was removed from similar trees in 24 minutes by the machine.

3442. Carrante, V., and del Gaudio, S.
Efectos de la incisión anular en olivo. **(The effects of ringing olive trees.)**
Olivicoltura, 1951, No. 7, from abstr. in *Bol. Oleic. int.*, 1951, No. 4, pp. 69-70.

Experimental ringing of olive trees at the Bari Agricultural Experimental Station, Italy, in 1950 took the form of single cuts, double cuts and double cuts with ring-barking. Statistical study showed no significant difference between the effects of these 3 treatments.

Fruit thinning and other cultural practices.

(*See also* 3477w.)

3443. Luckwill, L. C.
Trials with growth substances as fruit-thinning agents.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 33-40, bibl. 7.

In preliminary trials in 1950 and 1951 NAA was applied at 20, 30 or 40 p.p.m. as a post-blossom spray to the apples Miller's Seedling, Emneth Early, Crawley Beauty and Laxton's Superb. When applied 2-4 weeks after petal-fall it induced seed abortion, thereby leading to an increased drop of young fruitlets. It also exerted a retarding effect on fruit growth, this effect becoming more marked, the longer the interval between petal-fall and the application. Post-blossom applications of NAA at 20 p.p.m. to Williams' and Conference pears had no thinning action. Among 7 other growth substances tested on Laxton's Superb apples only 2:4:5-T had any significant thinning action and this also reduced fruit size at harvest. 2:4:5-trichlorophenoxy-propionic acid caused the fruits to ripen on the tree in August. A fuller account of this work is to be published in the *J. hort. Sci.*

3444. Kelley, V. W.
Chemical thinning of apples.
Trans. Ill. St. hort. Soc. for 1951, 1952, pp. 76-89.

The principles, practice and advantages of using both caustic and hormone fruit thinners are discussed, and results of experiments on Duchess and Transparent varieties are recorded. When a heavy set is expected it is recommended to spray with NAA at the calyx stage or a week later at a time when weather conditions are favourable for drying. Thorough application with a mist sprayer is suggested, and optimum concentrations for different varieties are given.

3445. Cooper, J. R.
Thinning peaches for better fruit.
Ark. Fm Res., 1952, Vol. **1**, No. 1, p. 1.

Experiments carried out in Arkansas have shown that peaches thinned to one fruit per 45 and 60 leaves produced larger and better coloured fruit than those thinned to one fruit per 15 and 30 leaves. No significant difference was obtained from thinnings made 30, 50 and 70 days after full bloom; the operation is, however, quicker, easier and safer if done when the main drop is over. Blossom thinning of peaches is considered unsafe where late frosts may be expected.

3446. Hartmann, H. T.
Spray thinning of olives.
Calif. Agric., 1952, **6**: 5: 7.

Experiments made since 1946 in California have shown that overloaded olive trees can be successfully thinned by spraying with 100 to 125 p.p.m. NAA plus a 1½% light-medium summer oil or with about 150 p.p.m. without oil from 20 to 28 days after full bloom. Spraying reduced the proportion of undersized fruit from 77% to 33% in 1951.

3447. Lott, R. V.
Results of research with Color-Set 1004 in 1951.
Trans. Ill. St. hort. Soc. for 1951, 1952, pp. 73-6.

This proprietary drop-inhibitor was found to be effective on Transparent, Stayman, Winesap, Jonathan, Golden Delicious and Turley apple trees. In the case of Wealthy, Color Set 1004 did retard preharvest drop but the fruit was overripe at harvest.

3448. Davidson, J. H.
Suggestions for the use of Color Set in 1952.
Down to Earth, 1952, **8**: 1: 8-10, illus.

Preharvest sprays containing α-(2,4,5-trichlorophenoxy) propionic acid (TCPPA) as the triethanolamine salt were widely used last year in various apple growing districts in the United States. For reducing pre-harvest fruit drop there is general agreement that TCPPA sprays (under the trade name Color Set) are generally superior to naphthalene-acetic acid sprays, but there is considerable controversy as to their effect on colour development. Special care must be exercised to harvest the fruit when proper maturity is attained since apples will hang on and may become over-ripe on the trees. This is especially true of the earlier varieties including McIntosh.

3449. Falch, J., and Strauss, E.
Versuche über die Anwendung von Fruchtfallhormonen. **(Trials with hormones for control of fruit drop.)** [English and French summaries 12 lines each.]
Mitt. Klosterneuburg, 1952, **2**: 119-23.

Two proprietary preparations, "Shellestone" and "24a", sprayed to give complete coverage on a number of varieties of apples and pears 4-5 weeks before harvest inhibited fruit drop. The growth of the trees and growth and ripening of the fruit were not affected by the treatment, nor was the storage life of the fruit.

3450. Riera, F. J.
La caída fisiológica de la aceituna y su control por las substancias reguladoras de caracter fito-hormonal. **(Physiological fruit drop of olives and its control by growth substances.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 490-524, bibl. 9, illus.

Physiological fruit drop in olives occurs normally at 3 critical periods: fruit set, kernel formation and pre-maturation. It is most serious on shallow, dry soils and in cold districts. A series of experiments carried out in Spain showed that this type of fruit fall can be controlled, at least partially, by growth substance sprays. These were most effective on late ripening varieties. In pre-harvest sprays α-naphthalene acetic acid and 2,4-D were equally effective and the best results were obtained with high concentrations, $5 \cdot 10^{-3}$ molar. For post-blossom sprays lower concentrations, in the order of 10^{-4} molar, were sufficient. For varieties very prone to fruit fall 2 sprays, a low-concentration post-blossom and a high concentration pre-harvest were beneficial. By allowing the fruit to ripen more

fully on the trees, growth substance sprays increased the oil content of the fruit. The sprays did not appear to have any inhibitory effect on fruit bud formation. The data obtained are tabulated in detail.

3451. Holodnyĭ, N. G.
Artificial parthenocarpy and hastening the ripening of fig fruits. [Russian.]
Priroda, 1952, **41**: 3: 100-2, bibl. 4.
This is a review of the results obtained in California on inducing parthenocarpy and hastening ripening of figs by the application of hormones. The author considers that the technique may be applicable in those regions of the U.S.S.R. where figs do not ripen fully because of the cool climate.

3452. Malašenko, P. V.
Transplanting mature fruit trees. [Russian.]
Sad i Ogorod, 1952, No. 5, pp. 11-16, illus.
This article discusses first the relation between the age of the trees, their size, and the extent of the root systems with reference to the size of the excavations necessary for removing them. The methods of transplanting are then described in detail for cases in which the soil is retained or removed. Transplanting may be carried out in all four seasons in Russia, but attention must be given to the stage of development. In spring it must be done before there is any sap movement or swelling of the buds; in summer when the current year's shoots begin to be woody and are 6-8 cm. long, from the beginning of June for 20 days; in autumn after growth ceases and for a period of 30-40 days; and in winter from the time frosts begin until heavy snow falls. Transplanting in spring is most effective in central Russia. It is stated that with the methods described 300 trees were transplanted without loss.

Harvesting, grading and marketing.

(*See also* 3477 l, q.)

3453. Hechero, L. E.
The horizontal fruit picker.
Philipp. agric. Engng J., 1950, 4th Quarter, p. 142, from abstr. in *Agric. hort. Engng Abstr.*, 1951, **2**, No. 892.
The fruit picker described was evolved from the principle of the tree pruner but with its clipping motion transmitted through a secondary lever instead of directing it to the blade as in the case of the pruner. The advantages are: it cuts horizontally, a position best adapted to the nature of most fruits; the chute directs the fruit to the hand of the operator; it is adaptable to bamboo poles; and its spring is enclosed and therefore less subject to damage.

3454. Davis, L. E., Marks, A. R., and Kilbuck, J. H.
Improving prune harvesting.
Calif. Agric., 1952, **6**: 4: 3, 13-14, illus.
A progress report is given on methods of reducing the cost of harvesting prunes. The use of pneumatic tree shakers has proved superior to the usual pole-beating method for crops of over 40 tons. On levelled ground raking and the use of scoops facilitated collection. For crops exceeding 170 tons an adapted nut pickup machine used on previously levelled land was the most economical, but a mechanized catcher frame to be tested this year may prove equally efficient. Although some of the methods need perfecting, it would appear that they could reduce harvesting costs by more than 60% in some cases.

3455. Gaston, H. P., and Levin, J. H.
Field grading red tart cherries.
Quart. Bull. Mich. agric. Stat. 1952, **34**: 343-9.
Field grading of sour cherries by the pail method is considered most suitable for Michigan. The procedure, in which numerous pails are used, is described, and its advantages are pointed out.

3456. Liebster, —.
Maschinen für die Obstsortierung. **(Machines for fruit grading.)**
Technik Bauern u. Gärtner, Edition G, 25 Jan. 1951, p. 47, from abstr. in *Agric. hort. Engng Abstr.*, 1951, **2**, No. 896.
Various types of fruit graders with throughputs ranging between 3 cwt. to about 6 tons per hour are described and their labour and power requirement and throughput are specified. Some machines incorporate a cleaning, impregnating and polishing device comprising several sets of brushes which clean the fruit and then polish it, the brushes being saturated with liquid paraffin; in this way the eyes of the fruit are not impregnated, which permits a limited exchange of gases in storage.

3457. Hartline, B. F.
Our coming experiment in hydro-cooling of peaches.
Trans. Ill. St. hort. Soc. for 1951, 1952, pp. 276-83.
A commercial method of pre-transport cooling and sterilizing of peaches by the use of iced water and sodium hypochlorite is described.

3458. Smith, W. H.
Deterioration in fruits and vegetables during marketing.
Fruitgrower, 1952, No. 2949, pp. 22-3.
A brief report on the early stages of a scientific investigation with the view to reducing losses, improving quality and regulating supplies of Cornish broccoli, outdoor lettuce, plums and strawberries.

3459. Bressler, R. G.
Studies on efficiency in fruit marketing practices.
Calif. Agric., 1952, **6**: 6: 8-9, 12.
Over the period 1946-50 Washington apple growers received at the packing house door an average of only 39% of the price paid by wholesalers in eastern auction markets; comparable figures for Californian pears and grapes were 43% and 32% respectively. An exact comparison with retail prices is not available, but it would seem that for the apples and grapes the farmer received about 26% and 20% respectively of the price paid by the consumer. A study during 1949-51 is reported in which marketing charges for Washington apples and California pears and grapes were broken down to show costs of picking and hauling to packing house, packing, container, etc., shipping point services, freight and refrigeration, and auction charges. The costs of packing pears and of handling cannery fruit

in 11 pear packing houses in California are further analysed in detail. The cost of packing pears averaged approximately $1.00 per box, about 30% of this going on labour, 10% on operating and administration, 50% on packing boxes and materials and 10% for fixed charges for buildings, land and equipment. The analysis suggests that even the best houses could improve their efficiency in some operations.

Storage.

(*See also* 3477y, 4527, 4529.)

3460. CASTBERG, C.
SPF:s lagringstävling 1950-51. (Apple storage competition of the Swedish Pomological Society 1950-51.)
Fruktodlaren, 1951, No. 5/6, pp. 134-7.

The keeping quality of Cox's Orange, Cox's Pomona, Ribston and Belle de Boskoop was somewhat inferior to that recorded in earlier trials. This year's report is chiefly concerned with the percentage of fruit that falls into the various grades from "extra-prima" to waste and with the resulting commercial value of the stored lots.

3461. HARDISTY, S. E.
Gas storage of apples.
J. agric. W. Aust. 1952, **1** (n.s.): 227-9, bibl. 2.

Gas storage of apples is discussed with reference to results obtained in Great Britain and America, and those obtained from a large-scale trial carried out by the Victorian Department of Agriculture. A table summarizes conditions recommended for gas storage of the varieties Jonathan, Granny Smith and Democrat.

3462. POAPST, P. A., AND PHILLIPS, W. R.
Air purification and soluble pectin accumulations in Lawfam apples.
Sci. Agric., 1952, **32**: 109-13, bibl. 5, being *Contr. Div. Hort., exp. Fms Serv., Ottawa* **755**.

Lawfam apples were held in ordinary, ventilated and carbon filtered storage. The eating ripeness of apples in all three stores coincided with peak pectin accumulations after approximately 160 and 150 days of storage. Pectin accumulation was suppressed in the ventilated and filtered samples, and as a result better retention of quality after optimum ripeness was obtained. Up to 18 days' additional storage life was gained by the filtration.

3463. MOHORČIĆ, H.
Doprinos k študiju izgube pri teži vskladiščenih jabolk. **(Loss of weight from stored apples.)**
Arh. poljopr. Nauk., 1951 (issued March 1952), **4**: 6: 140-52.

The author gives the basic arithmetical equations for determining the loss of weight, caused by metabolism and water loss, in 6 apple varieties (Reinette Ananas, Yellow Bellefleur, Bohnapfel, Belle de Boskoop, Reinette du Canada and King of the Pippins) stored at temperatures of 1-2° C. and 8° C. and at a constant relative humidity of 85-90%. Constant control of the water content of apples, by regulating the air humidity of stores used for long-term storage, is recommended. D.S.

3464. ULRICH, R., RENAC, J., AND MIMAULT, J.
L'influence d'un réchauffement de quelques jours à +15° sur le métabolisme des poires Williams conservées à 0°. **(The effect of heating for several days at +15° on the metabolism of Williams' pears stored at 0°.)**
C.R. Acad. Agric. Fr., 1952, **38**: 242-4.

An experiment was made to ascertain whether, when the ripening of fruits has begun, it will continue, even under unfavourable conditions. Williams' pears were picked on 29 August while still green, brought into the laboratory and held at a temperature of 0° C. Some were then placed in an incubator at +15° C. on 15 October and kept there until 19 October when they were returned to the room at 0° C. The chemical composition of the pears was determined at various times during their incubation period. It was found that the metabolic activities of the pears which had been subjected to the three temperatures (0°, +15°, 0° C.), were greater than those remaining at 0° C., but noticeably less intense than in pears maintained at +15° C.

3465. BOYES, W. W., GINSBURG, L., AND DE VILLIERS, D. J. R.
Storage tests with plums.
Fmg S. Afr., 1952, **27**: 299-302, illus.

Santa Rosa, Gaviota and Kelsey plums are successfully shipped from South Africa to the U.K. at dual temperatures of 31° F. for 8 days and then 45° F. (or 50° F. for Kelsey). For shipment to the U.S.A., however, a constant temperature of 31° F. is required to sterilize the fruit against possible fruit fly infection. In storage tests early, mid- and late season plums of the three varieties from several districts were held for 28 days at 31° F. followed by ripening at 50° F. A high percentage of internal breakdown and failure to ripen properly occurred in Kelsey and Santa Rosa, the incidence of breakdown in the latter increasing as the season advanced. With Gaviota, however, all samples stored well and ripened normally.

Composition.

3466. MAGEE, H. E.
Nutritive values of fruit and fruit juices.
Food Manuf., 1952, **27**: 135-7, bibl. 11.

A table of the composition of some pome, stone and soft fruit juices is given, and the available information on the value of fruit juices in nutrition and in the treatment of diseases is assessed.

3467. KIDD, F., AND OTHERS.
Metabolism of sucrose in apples. I.
J. hort. Sci., 1952, **27**: 179-91, bibl. 7.

The pattern of behaviour of apples (Bramley's Seedling and Worcester Pearmain) as regards their sucrose content during growth and in storage is described, and a general formulation, which covers all the cases examined, is put forward. [Authors' summary.]

3468. TIMBERLAKE, C. F.
The content of arsenic, copper, iron, lead and zinc in apples, juices and ciders.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 160-4, bibl. 5.

The natural contents of Cu, Zn, Fe, Pb and As are tabulated for 9 culinary and dessert apple varieties

and for 8 cider apples, and for juices and ciders prepared from the latter. In the fruit the ranges of contents in p.p.m. were: Cu 0·27–0·59; Zn 0·21–0·76, Fe 1·0–2·5, Pb 0·02–0·16 and As <0·04.

3469. HULME, A. C.
The isolation of *l*-quinic acid from the apple fruit.
J. exp. Bot., 1951, **2**: 298-315, bibl. 38, illus.

The isolation and characterization of *l*-quinic acid from apple fruits is described and its possible function in plants is discussed. The evidence suggests that quinic acid provides one link between what might be called the aliphatic and aromatic metabolisms of the plant.

3470. WEURMAN, C.
Pectine-omzettingen en pectine-fermenten in Doyenné Boussoch peren. **(Pectin conversions and pectic enzymes in Doyenné Boussoch pears.)** [English summary 1½ pp.]
Publ. centr. Inst. Voedingsonderz. T.N.O. Utrecht **147**, 1952, pp. 74, bibl. 121.

A review of the literature shows that no proof has ever been obtained of the existence in pears of either pectase, pectinase or proto-pectinase. In a series of experiments described here, Doyenné Boussoch pears were picked at various stages of development and the quantity of pectin in the fruit pulp measured directly after it had been prepared and after it had stood for a week. Pectin was also determined in pears ripened after picking at the commercial time and in pears stored at 2° C. for a few months. In some cases the quantity of pectins in the pulp diminished on standing, indicating that in those cases pectinase, and probably also proto-pectinase, was present in the pulp. The presence of pectase in the fruit was proved by the production of gels in pectin solutions on addition of extracts of pears and by titrimetrical determinations of the activity of preparations from these extracts. The quantity of the enzyme per unit weight of fruit pulp was determined during the development and ripening of the fruit. The relatively high concentrations during the early stages of development started to fall at the beginning of August and reached a minimum about commercial picking time. When fruit is picked before commercial picking time, however, and is kept at room temperature for 3 weeks, the quantity of pectase does not fall any further. Previous failures to prove the presence of pectinase in fruits is explained by the presence, in the varieties investigated, of 2 inhibitors for pectinase activity. The development and properties of one of these inhibitors was studied. It has been found that the adsorption properties of inhibitor and pectinase are different, so it is now possible to prepare extracts and pulps in which the ratio of pectinase to inhibitor is shifted in favour of the enzyme. In this way the presence of pectinase in the fruit could also be shown by viscosimetric and reductometric methods.

3471. MORRIS, Q. L., AND WENDER, S. H.
Preliminary investigations of the flavonoid pigments in prunes.
Proc. Okla Acad. Sci. 1950, 1951, **31**: 93-4, bibl. 1.

Preliminary studies at the University of Oklahoma on Sunsweet prunes have indicated the presence of at least one, and probably three, flavonoid pigments. Investigations on their identity are in progress.

Processing.

(*See also* 3477b, c, e, 4527.)

3472. KIESER, M. E., AND POLLARD, A.
The effect of fruit storage on apple juice processing. II.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 188-92, bibl. 6.

The culinary apples Bramley's Seedling, Lane's Prince Albert, Edward VII and Newton Wonder and the dessert variety Laxton's Superb were stored at 3-5° C. from October to April. Samples for pressing were taken at intervals of about 6 weeks. The juice analyses showed a decline during storage in specific gravity in all cases, a decrease in total sugar but an increase in the proportion of reducing sugar to sucrose, a steady rise in pH, little change in tannin, an increase in the amount of pectin passing into the juice and deterioration in flavour in some varieties but not others. These results, taken in conjunction with those obtained the previous year [see *H.A.*, 21: 3305], indicate that, whereas dessert varieties used for juice production should be pressed in a fresh condition, a limited period of storage offers a means of reducing the excessive acidity of high acid culinary varieties.

3473. W.
Sauerkirschen und Kirschsaft in der Süsswarenfertigung. **(Sour cherries and cherry juice in confectionery production.)**
Gordian, 1952, No. 1238, pp. 20-21.

Good flavour, pleasant aroma and highly coloured juice are among the characteristics required from sour cherries used in the manufacture of confectionery in Germany, for which purpose the varieties Rote Maikirsche, Königin Hortense, and Minister von Podbielski were found very suitable.

3474. DAVIS, L. E., MARKS, A. R., AND KILBUCK, J. H.
Improving prune dehydration.
Calif. Agric., 1952, **6**: 5: 11-12, illus.

Various labour saving improvements are suggested as a result of studies on existing dehydration practices.

3475. LOEW, G.
Esperimenti su una nuova lavorazione delle olive. **(A new method of processing olives.)**
Olearia, 1951, **5**: 277-84, bibl. 8.

The method described consists of the dehydration of olives by application of heat and subsequent regeneration by immersion in water or in a NaCl solution at various degrees of concentration and temperature. This will allow the oil to be extracted by ordinary crushing between millstones, and the pressing of the paste in open tower hydraulic presses. The method promises economy without sacrifice of oil character.

3476. GAROGLIO, P. G.
Esperienze circa l'uso di elettroliti nella macinazione delle olive con osservazioni elaiotecniche. **(The use of electrolytes in crushing olives and some remarks on oil extraction technique.)**
Olearia, 1951, **5**: 341-52, bibl. 12.

An account of successful experiments at the Institute of Agrarian Industries of the National University of Cuyo, Mendoza, Argentina, on the use of electrolytes, especially NaCl, in the preparation of olive paste and the correction of rancidity and acidity of olive oils.

Noted.

3477.

a AUBIN, L.
La Passe Crassane, sa culture, sa conservation. **(Passe Crassane, its cultivation and storage.)**
Bull. Soc. centr. Hort. Seine-Infér., 1951, No. 3, pp. 35-42.

b BARKER, B. T. P.
Cider: from farm to factory.
Agriculture, Lond., 1952, **59**: 192-6.
Includes notes on Devonshire varieties.

c BARKER, B. T. P.
Studies on cider sickness. II. The effects of heat treatment of ciders on the incidence of sickness.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 164-76, bibl. 7.

d BISHOP, C. J.
The importance of polyploidy in modern apple breeding.
Fruit Var. hort. Dig., 1950, **5**: 63-6, illus.

e BURROUGHS, L. F.
The control of fermentation in cider. I. The influence of nitrogen and accessory growth factors on the stability of centrifuged ciders.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 138-48, bibl. 8.

f CARRANTE, A.
Relación sobre la actividad en el campo de la técnica de la oleicultura. **(Report on experimental work with olives.)**
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 199-203.
Pruning and ringing at the Bari Agricultural Experimental Station, S. Italy.

g CASTORINA, S.
La acidez del aceite de oliva en relación con la variedad y conservación de la aceituna. **(The acidity of olive oil in relation to the variety of olive and the method of preservation.)**
Olivicoltura, 1951, No. 7, from abstr. in *Bol. Oleic. int.*, 1951, No. 4, p. 70.

h DALBRO, S.
Ungdomsformer hos frugttraeer. **(Juvenile forms in fruit trees.)**
Horticultura, 1951, **5**: 61-3, bibl. 9.
A review of the literature.

i DERMEN, H.
Polyploidy in the apple.
J. Hered., 1952, **43**: 7-8, bibl. 6, illus.
Found 7 years after colchicine treatment.

j FEDORENKO, M. M.
Prostrate apricots. [Russian.]
Sad i Ogorod, 1952, No. 1, pp. 23-4.
Training for hardiness.

k FRENCH, A. P.
The peach—inheritance of time of ripening and other economic characters.
Bull. Mass. agric. Exp. Stat. **426**, 1951, pp. 31, bibl. 20.

l HAUCH, H.
Regulativ for sortering, kvalitet, pakning og emballering ved udførsel af frisk, dansk frugt. **(Regulations on the grading, packing and quality of fresh Danish fruit for export.)**
Erhvervsfrugtavl., 1951, **17**: 271-7.

m HOWLETT, F. S.
Fruit production program in Yugoslavia.
Foreign Agric., 1952, **16**: 12-16, illus.

n KAJI, A., AND MINO, M.
On the retting of plant fiber materials in Japanese hand made paper manufacture (I) and (II). On the retting of " kuwa " (*Morus alba* L.) fiber material (I) and (II).
KAJI, A.
On the retting of plant fiber materials (barks of mulberry tree) for Japanese paper manufacture. III. On the fermentation-retting of the materials sterilized under ordinary pressure.
KAJI, A., AND MINO, M.
Idem. IV. The influence of vitamin B_2 and aerobic bacteria on the fermentation retting by *Clostridium acetobutyricum*. [Japanese with English summaries 10 lines, 1 p., ½ p. and ½ p. resp.]
Tech. Bull. Kagawa agric. Coll., 1949, **1**: 2: 57-63, bibl. 6, 64-71, bibl. 1; 1951, **2**: 130-5, bibl. 2, and 1951, **3**: 33-7, bibl. 7.

o KARNATZ, H.
Erfahrungen mit der maschinellen Entkernung des Grahams Jubiläum. **(Mechanical decoring of Grahams Jubilee apple.)**
Mitt. ObstbVersuchsrings Jork, 1951, **6**: 163-8, illus.
For providing seed for rootstocks.

p KÁRPÁTI, Z.
Újabb taxonómiai vizsgálatok a *Sorbus aria* S. L. és a *S. torminalis* közé eső hazai berkenyéken. **(Further taxonomic studies on Hungarian *Sorbus* species related to *S. aria* and *S. torminalis*.)** [German and Russian summaries 1 p. each.]
Agrártud. egy.,* 1950, **1**: 31-52, bibl. in text, illus. [received 1952].

q MCCOWARD, D. J.
Grading and inspection of fresh fruit and vegetables in the U.S.A.
Agriculture, Lond., 1952, **59**: 135-9.

r MINISTRY OF AGRICULTURE, LONDON.
The pollination of plums and cherries.
Adv. Leafl. Minist. Agric. Lond. **378**, 1951, pp. 6, 2d.

* Formerly *Bull. Fac. Hort. Buda.*

s MINISTRY OF AGRICULTURE, LONDON.
Plums and damsons.
Adv. Leafl. Minist. Agric. Lond. **268**, 1952, pp. 4, 2d.
Notes on rootstocks, varieties and cultivation.

t MORETTINI, A.
Influencia de la desfoliación prematura en la floración y fructificación del olivo. (**The effect of premature defoliation on the flowering and fruiting of the olive.**)
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 299-320, bibl. 14.
See *H.A.*, 22: 158 for Italian version.

u PÉNZES, A.
A *Prunus fruticosa—Prunus mahaleb* hibridról. (**A *Prunus fruticosa* × *P. mahaleb* hybrid.**) [English and Russian summaries ¼ p. each.]
Agrártud. egy.,* 1950, **1**: 21-3, illus. [received 1952].
A brief description of a *Prunus* found in the Buda Mountains.

* Formerly *Bull. Fac. Hort. Buda.*

v SEMENOV, I. M.
Selection of fruit varieties for orchards. [Russian.]
Sad i Ogorod, 1952, No. 1, pp. 24-9, bibl. 2.
In the Stalingrad region.

w STRUCKMEYER, B. E., AND ROBERTS, R. H.
Chemical thinning on apples.
Wis. Hort., 1952, **42**: 177-8, illus.
With App-L-Set (NAA).

x VALLEGGI, M.
Aportación a las investigaciones sobre la autofertilidad del olivo. (**A contribution to investigations on the self-fertility of the olive.**)
13th Congr. int. Oleicult. 3. Actas Oleicult. 1950, Madrid, Vol. 1, pp. 293-8, bibl. 12.
Using the varieties Mignolo and Barouni du Dahel.

y (WOODHEAD, C. E.)
Low temperature breakdown in Sturmer, Jonathan and other apples.
Fruit World, Melbourne, 1951, **52**: 9: 13, 15, bibl. 12.
See also *H.A.*, 22: 200.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 3259, 3327, 3349, 3366, 3367, 3536b, e, g, h, i, 3543, 4541.)

3478. MACNICOL, C.
Berry fruit industry [in Australia].
Quart. Rev. agric. Econ., 1950, **3**: 115-18.
The berry fruits grown commercially in Australia are, in order of importance, raspberry, black currant, strawberry, gooseberry, loganberry and red currant. Of the total of about 6,300 acres 80% is concentrated in southern Tasmania. Information is given on acreages, yields per acre, and certain items of costs and returns for the period 1935 to 1949.

3479. BOLLEN, A. G.
Berry fruits industry [in Tasmania].
Quart. Rev. agric. Econ., 1952, **5**: 8-11.
During 1951 the Bureau of Agricultural Economics made a survey of production costs and trends based on returns from 67 soft fruit growers in Tasmania. Details given include bearing and non-bearing acreages, yields per acre, capital values, overheads, cultivation costs and harvesting costs. Total costs per lb. worked out at: raspberries 6·66d., black currants 7·78d., loganberries 6·86d., gooseberries 3·09d. and strawberries 14·27d. At average prices received on the farm net returns ranged from a loss of 0·53d. to a profit of 0·99d. per lb. (a loss of £5 7s. 9d. to a profit of £17 0s. 5d. per acre). Where raspberries were irrigated, yields were 22% higher than for non-irrigated areas; costs per acre were 32% higher, but the cost per lb. was only 0·5% higher, and the net profit per acre increased by £3 7s. 0d.

3480. PANSIOT, F.
La culture des arbrisseaux à fruits en Côte-d'Or. (**Small fruit culture in the Côte d'Or.**)
Jardins Fr., 1952, **6**: 16-26, illus.
The cultivation of black currants, red currants and raspberries in the Côte d'Or is described in some detail. *Black currants.* The 2 varieties grown, Burgundy black and Royal (de Naples), are multiplied by cuttings which are generally planted out unrooted after standing in water for 20-30 days. Spacing varies from 1·1 by 1·2 m. to 1·5 by 1·7 m. The centres of the bushes are kept open. Yields average 0·5-0·8 kg. per bush, but may reach 2·5 kg. A mature crop can produce 3,000 kg./ha. The life of a crop is 35-40 years. *Red currants.* The common varieties are Versaillaise rouge, Groseille commune, Hollandaise rouge and Groseille cerise. Multiplication and method of training are the same as for black currants. Spacing varies from 1·5 by 1·5 m. to 1·7 by 1·7 m. Yields are 1-4 kg. per bush and 4,000 kg./ha. The life of a crop is about 30 years. *Raspberries.* The common varieties are Rose de Plombières and Violette. Spacing is 1–1·5 m. by 1·3–1·5 m. Yields are 3,000-6,000 kg./ha. The life of a crop is at least 30 years. *Loganberries* are under trial.

3481. CRANG, A., AND STURDY, M.
A comparison of some varieties of fruit preserved by bottling, canning and freezing. Progress report II.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 193-9, bibl. 3.
The fruits of six varieties of black currant, 6 of cherry, 3 of gooseberry, 4 of strawberry and 1 loganberry were preserved by bottling, canning and deep freezing. As in previous tests the frozen fruit was generally superior to heat-processed fruit in colour, but frequently inferior in texture or flavour. Notes are supplied on the response of each variety to the 3 methods of processing. Although the results generally confirm those obtained earlier, it is clear that a variety should be tested over several seasons before any reliance can be placed on the individual results.

3482. VAILE, J. E.
Small fruits for processing.
Trans. Ill. St. hort. Soc. for 1951, 1952, pp. 118-31.
The qualities required in small fruits for successful processing, chiefly freezing, are enumerated. Suitable varieties of strawberry, blackberry, raspberry and blueberry are suggested. The effects of soil, climate, fertilizer, cultivation and weed control, harvesting and handling on the quality of the fruit are discussed, and practical recommendations are made.

3483. FERRES, H. M.
The effect of maleic hydrazide in delaying flowering and fruiting.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 40-2, bibl. 2.
Maleic hydrazide at concentrations of 10 to 1,500 p.p.m. sprayed on Norfolk Giant raspberries, Royal Sovereign strawberries, Baldwin black currants and Laxton's Superb apples either just before, during or after bud burst did not delay flowering, but with raspberries and strawberries they retarded the development and ripening of the fruit.

3484. MAHLSTEDE, J. P., AND WATSON, D. P.
An anatomical study of adventitious root development in stems of *Vaccinium corymbosum*.
Bot. Gaz., 1952, **113**: 279-85, bibl. 5, illus., being *J. Art. Mich. agric. Exp. Stat.* **1219**.
The initiation and development of adventitious roots in hardwood cuttings of high-bush blueberries were studied in the laboratory, methods and techniques being described. As the lignified pericyclic fibres and the thick cuticle of the epidermal cells inhibited root projection, it is suggested that means should be sought to dissolve these and thereby improve rooting percentages.

3485. LEWIS, D. C.
Straw mulches for soft fruit.
Fruitgrower, 1952, No. 2945, pp. 1043-4, illus.
Black currant varieties grown under straw mulch produced a much heavier crop than the corresponding varieties grown under clean cultivation. After 3 years of straw application improvement in soil structure was observed.

3486. LISAVENKO, M. A.
Fasciation in black currants. [Russian.]
Sad i Ogorod, 1952, No. 6, pp. 30-2, illus.
Mention is made of fasciation of the peduncle in the black currant varieties Goliath and Stahanovka Altaja (a seedling of Goliath). In the latter not only was the peduncle fasciated but some of the berries were twinned.

3487. FAIVRE, M.
La groseille, le cassis, productions d'avenir et sources importantes de profits. **(Future prospects for the commercial cultivation of gooseberries and currants.)**
Pomol. franç., 1952, **79**: 10-13.
This is a plea for the extension of the cultivation in France of *Ribes* spp. The propagation of these fruits is mentioned—the red and the black currant by hardwood cuttings, and the gooseberry (*Ribes uva-crispa*) by layering the one-year-old branches. Varieties, selected from those grown in Great Britain, are listed according to their use for special purposes. The author is convinced that there is a promising future for growing these fruits in France, if the growers will follow the lead shown by Great Britain.

3488. PADFIELD, C. A. S., AND BAILEY, F. L.
Chinese gooseberries (*Actinidia chinensis*). A survey of their behaviour in cool-storage at all stages of harvest maturity from May to July.
N.Z. J. Sci. Tech., Sect. A, 1952, **33**: 5:113-16, bibl. 1.
Chinese gooseberries harvested during the period from early May to late July can be successfully cool-stored at 31-32° F. for two months. Fruit harvested from late May to mid-June can be held for a longer period. When stalks were clipped short this fruit travelled well without pads or wrapping. Considerable softening occurred during two months cool-storage and berries in this condition were severely damaged during transit by rail.

3489. (MATHESON, P.)
Ascorbic acid in Chinese gooseberries.
Food. Pres. Quart., 1951, **11**: 34.
The ascorbic acid content of 3 separate fruits of Chinese gooseberry varied from 141 mg./100 g. pulp of one fruit analysed immediately after exposure to air to 39 mg./100 g. pulp of another fruit analysed 5 hrs. after exposure.

3490. WAIN, R. L., WHITAKER, J. C., AND WIGHTMAN, F.
Rooting of hardwood gooseberry cuttings.
Gdnrs' Chron., 1952, **131**: 150, bibl. 2, illus.
Trials conducted at Wye College to improve the rooting of gooseberry hardwood cuttings with growth substances have shown that on the basis of percentage cuttings rooted no treatment gave a significant improvement over the controls. It was evident, however, that some growth substances stimulated root growth. A 24-hour soak treatment with 2,4,5-T at 20 p.p.m. gave some 5 times greater root weight than the control cuttings. An α-NAA treatment at 50 p.p.m. was also found to improve root weight, but 1:2:3:4-tetrahydro-1-naphthoic acid at the concentrations used had little effect.

3491. PORPÁCZY, A., AND FARAGÓ, M.
Szedermalna fajhibridek. **(Raspberry hybridization.)** [German summary 1¼ p.]
Agrártud. egy.,* 1950, **1**: 3-9, bibl. 7, illus. [received 1952].
To improve the vitality of Hungarian raspberry varieties crosses were made between raspberry (*Rubus idaeus*) variety Lloyd George and dewberry (*R. caesius*) and the most promising of the progenies, hybrid No. 6201, in turn was crossed with loganberry (*R. loganobaccus*). The clone of the resultant polyhybrids possessing the most favourable characteristics of the 3 parents was called *R. mohácsyanus* Porpáczy and is now under observation.

* Formerly *Bull. Fac. Hort. Buda.*

3492. KENNARD, W. C., AND MECARTNEY, J. L.
1951 strawberry variety trials at State College, Pennsylvania.
Progr. Rep. Pa agric. Exp. Stat. **66**, 1952, pp. 4.

Notes are given on the performance and quality of strawberry varieties tested in Pennsylvania. Temple produced a highly significantly greater number of rooted runners than any of the other varieties, while Midland and Fairpeake were exceptionally poor in runner production. Fairland and Temple yielded more heavily than any of the other varieties; Catskill, Fairpeake and Midland gave uneconomically low yields.

3493. BAILEY, R. M., AND MURPHY, E. F.
Orland, Monmouth and Maine 55 strawberries.
Misc. Publ. Me agric. Exp. Stat. **620**, 1952, pp. 8.

The new strawberry varieties described were developed at the Maine Agricultural Experiment Station, and are recommended for trial, particularly in home gardens where winter hardiness, vigour and red stele resistance are important considerations.

3494. REID, R. D.
Recent strawberry breeding in Scotland.
World Crops, 1952, **4**: 87-90, bibl. 8, illus.

In an attempt to overcome red core root rot caused by *Phytophthora fragariae* a systematic programme of breeding was started in 1933 at the West of Scotland Agricultural College, Auchincruive.* This work is reviewed here and reference is also made to work at East Malling on strawberry viruses. Auchincruive Climax, the most successful new variety introduced, remained free of red core infection for 7 years, but in 1948 small patches of infection were recorded. Recent tests with inoculum from these sources and from several other varieties, indicate that new strains of the fungus may arise at any time, but that these strains are specialized, attacking some resistant varieties and not others, and are generally no more virulent than existing strains. Efforts are now being made to produce commercially acceptable varieties resistant to the known new strains of the pathogen and which ripen at various seasons.

3495. KRONENBERG, H. G.
Nieuwe aardbeirassen in West-Europa. **(New strawberry varieties in western Europe.)**
Meded. Dir. Tuinb., 1952, **15**: 343-54, bibl. 14, illus.

Over 20 new varieties of strawberry recently raised in western Europe are briefly described, with illustrations of the fruits of 13 of them. Only a few of these, including the Scottish variety Auchincruive Climax and perhaps one or more Senga varieties (raised at Hamburg), are promising, some are not recommended, while others have not been sufficiently tested.

3496. GUTTRIDGE, C. G.
Inflorescence initiation and aspects of the growth habit of the strawberry.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 42-8, bibl. 1, illus.

The first microscopic changes in the growing point indicating inflorescence initiation were present in Royal Sovereign and Perle de Prague strawberry plants at the end of the first week in September. Auchincruive Climax showed wider variation in the time of differentiation; inflorescence initiation occurred from the second week of July and the first formed inflorescences gave rise to autumn flowers on mother plants. The sympodial habit of growth and certain aspects of branch crown formation are described in relation to inflorescence formation. This study forms part of an investigation into the growth habit of the strawberry, with reference to the influence of day length and low temperature on inflorescence and stolon formation.

3497. DENISEN, E. L., AND CRANDALL, P. C.
Bigger yields from everbearing strawberries.
Ia Fm Sci., 1952, **6**: 137-8, illus.

A three-row system of planting with 1 ft. between rows and plants and 2 ft. between beds is recommended for everbearing strawberries. Marked increases in late summer cropping from plants spaced in this way resulted from a combination of mulching with sawdust or cracked corn cobs and the removal of runners as compared with the usual matted row system. Four new varieties, Brilliant, Red Rich, Streamliner and Superfectiyn, seemed well adapted to this method.

3498. WALTMAN, C. S.
Nitrogen and phosphorus relationships in strawberries.
Bull. Ky agric. Exp. Stat. **562**, 1951, pp. 11, bibl. 6.

Sodium nitrate at 200 lb. per acre was applied to 7 varieties of strawberry in either spring or autumn, or both. Application of N in the spring of the fruiting year reduced yields on the average by 26·76%, compared with the unfertilized plots. This is thought to be a result of increased vegetative vigour. Autumn and spring applications also reduced yields, in some cases more than spring applications alone. In some cases autumn applications were beneficial but varieties differed in their response to this treatment. With spring application of nitrates, the amount of soluble N in the crowns was nearly twice as high as in unfertilized plants and much higher than in plants fertilized in autumn and spring. In plants fertilized in autumn alone the amount of soluble N in the crowns was lower during spring and early summer than in unfertilized plants.

3499. JUILLET, —., AND TURQUOIS, —.
Le traitement des fraisiers au 2,4-D. **(The treatment of strawberries with 2,4-D.)**
Phytoma, 1952, No. 37, from abstr. in *Rev. Agric. Brux.*, 1952, **5**: 612-13.

In experiments designed to assess its effects on the flowering and fruiting of strawberries, 2,4-D at 10 or 100 p.p.m. caused a high early yield (50% greater than the control for the first 2 weeks) but not a high total yield. The addition of β-naphthoxyacetic acid had no effect on the early yield but raised the total yield.

* The Strawberry Disease Investigation Unit has recently become an integral part of the Scottish Horticultural Research Institute, Dundee.

3500. VAN KOOT, Y., AND CAMFFERMAN, J.
Groeistofbespuiting en suikerbespuiting bij aardbeien onder glas. **(Spraying strawberries under glass with growth promoting substances and with sugar.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1952, **15**: 90-100, bibl. 12, illus.

The effect of spraying strawberries with growth promoting substances to improve fruit set is greater, the more the plants are forced and the less favourable the conditions for pollination. The substances sold for this purpose are not always the best. The preparation Fruitset has usually an unfavourable effect on the variety Deutsch Evern; Betapal, Berryset and 2,4-D may improve the setting of fruit, but the results are very uncertain and depend on growth conditions. Agroxone gave the best results on Deutsch Evern, the optimum concentration for early crops being about 75 p.p.m. and for outdoor crops 150 p.p.m., applied at intervals of 7 to 10 days. Spraying with sugar solutions from the time heating was started until the beginning of blossoming gave as good results as artificial irradiation with TL-tubes at a height of 50 cm. above the plants, the irradiation intensity being about 600 lux. When the plants were sprayed twice weekly with a 10% solution to which 0·025% sulphanilamide had been added, the yield was increased by 15 to 25%.—Proefstation voor de Groenten-en Fruitteelt onder Glas, Naaldwijk.

Vines.

(*See also* 3355, 3538d, f, 4513, 4564c.)

3501. WINKLER, A. J., AND OTHERS.
Research in viticulture.
Calif. Agric., 1952, **6**: 5: 3, 15-16, map.

Work in progress by the Division of Viticulture, Davis, California, includes studies on wine production processes, maturity studies on wine grapes and investigations on the chemistry of aroma and flavour materials. With table and canning grapes factors affecting berry size, such as time of girdling and time and extent of thinning, are being studied, as are the effect of overcropping on quality, the action of growth regulators and factors affecting keeping quality. In a breeding programme over 40,000 seedlings have so far been grown to fruiting. Fertilizer trials have shown some responses to N but little or no response to P and K; among minor elements only Zn has had any effect.

3502. NELSON, R. A.
The genus *Vitis* in Oklahoma.
Proc. Okla. Acad. Sci. 1950, 1951, **31**: 20-3, bibl. 1.

Brief descriptions are given of 10 species of *Vitis*, and a key provided for their identification. They include at least 2 species, *V. rupestris* and *V. riparia*, used as phylloxera-resistant stocks.

3503. THERON, C. J.
Three centuries of viticulture.
Fmg S. Afr., 1952, **27**: 127-31, 134, bibl. 3.

The first grape vines were planted in the Cape within a few years of van Riebeeck's landing, 300 years ago, and the history of the industry since that time is here reviewed.

3504. MALAN, E. F.
Can grapes be cultivated in the lowveld?
Fmg S. Afr., 1952, **27**: 246, 253.

Several varieties are described that have been cultivated with some success under the relatively hot, summer-rainfall conditions of the lowveld. To reduce sunscald, trellising is desirable, the most suitable method being the fish-spine in which 5 strands of wire, 9 in. apart, are run along cross-bars and the vines trained along the centre wire during pruning, the summer shoots later spreading over the side wires. Spacing of 7-8 ft. between rows and 5-6 ft. in the rows is recommended.

3505. PIJLS, F. W. G., AND VAN STUIVENBERG, J. H. M.
De groei van druif en perzik onder glas op rivierkleigronden en zandgronden. **(The rate of growth of grapes and peaches in glass houses on river-clay and sandy soils.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1952, **15**: 336-42.

A study of the growth of vines and peaches on various types of river clay soil in the Netherlands shows that the crops and the root systems are closely correlated with soil conditions, as indicated by observations made in profile-pits in various localities. Unequal ripening in the bunch, particularly in the grape variety Black Alicante, and the incidence of the Alicante disease and probably also shanking, are caused by deficient water and air in the soil. Peaches having roots near the surface, require a different type of soil from that suitable for vines. Profiles with a heavy sub-soil at a depth of 80 cm. can be used for peaches, but are not advisable for vines.

3506. LEVADOUX, L.
La sélection et l'hybridation chez la vigne. **(Selection and hybridization in the vine.)**
Ann. Éc. Agric. Montpellier, 1951, **28**: 165-357, bibl. 110, illus.

The paper consists of an ampelographical introduction, a section on selection [a reprint of a previous work, see *H.A.*, 19: 2835] and a section on hybridization. In this last, floral morphology, development and mechanism are briefly discussed and the possibilities of hybridization are considered at length. Each "variety" (cépage) may be regarded as a collection of clones which vary in homogeneity depending on the presence and persistence of viruses. Studies on the behaviour of the characters of progenies derived from crosses and selfing among "varieties" provides a means of determining the genetic composition of different clone populations. Transmission of quality and quantity characters in the fruit and of resistance to disease are discussed in detail, as also the technique of hybridization.

3507. VEGA, J.
La uvas "criollas" o Sudamericanas. **(The native or South American vine varieties.)**
Rev. Fac. Cien. agrar. Mendoza, 1950, **2**: 59, 61 [received 1952].

Some problems concerning the origin and identity of certain South American vine varieties are indicated.

3508. VRYONIDES, P.
New varieties of grapes.
Countryman, Nicosia, 1952, **6**: 3: 7-8.

Brief descriptions are given of the following wine grape varieties introduced to Cyprus from Australia: Shiraz, Riesling, Tokay, Sherry, Doradillo (Jaen), White Hermitage and Red Prince.

3509. Bruni, B.
Albana bianca. [An Italian white grape vine.]
Ital. agric., 1952, **89**: 164-6, bibl. 4, illus.
A short but detailed note on the important Italian vine Albana bianca, its morphology, vegetative and cultural characteristics, yield and wine.

3510. Fox, J. M., and Tellechea, H.
Acción dela tio-úrea y tio cianato de amonio como estimulantes de la germinación de la semilla de vid. **(Thiourea and ammonium thiocyanate as germination stimulants for vine seeds.)** [English summary ¼ p.]
Rev. Fac. Cien. agrar. Mendoza, 1950, **2**: 53-7, bibl. 5, [received 1952].
Seeds of the vine variety Malbeck were treated with 0·25, 0·5 or 1·0% thiourea for 24, 48 or 72 hr., or with the same concentrations of ammonium thiocyanate for 72, 96, or 120 hr. before sowing. The highest percentage germination (88%) was obtained by immersion in thiourea at 1% for 24 hr. Eighty-six per cent. germination was obtained as a result of immersion in thiourea at 0·5% for 24 hr. or at 0·25% for 48 hr. or by immersion in ammonium thiocyanate at 0·5% for 96 hr. The germination of the untreated controls was only 38%. The higher concentrations of thiourea retarded germination by about 10 days, whereas ammonium thiocyanate generally accelerated it by 9-11 days. The subsequent growth of plants treated with thiourea was better than that of the controls and than that of plants treated with ammonium thiocyanate.

3511. Manaresi, A., and Magrin, E.
Per aumentare l'attecchimento delle talee di viti americane nel terreno. **(Improved rooting of American vine cuttings in soil.)**
Riv. Vitic. Enol., 1952, **5**: 175-80, bibl. 11.
In experiments at Bologna University in 1940 and 1941 with grafted cuttings of Paradisa on 420 A, spraying with a 25% emulsion of paraffin oil at the time of planting resulted in 59% rooting compared with 38% in the controls. The method was easy and cheap, 900 g. of oil sufficing for 1,000 cuttings.

3512. Medvedeva, K. A.
Trials for raising vine cuttings in the open. [Russian.]
Sad i Ogorod, 1952, No. 4, pp. 34-5, illus.
From results of experiments recorded for a number of varieties advice is given for raising vine cuttings in the open ground around Moscow. Cuttings should be 20-25 cm. long with 2 or 3 buds, cut obliquely below the lowest bud, and their bases scratched longitudinally with a special instrument. Before they are planted they should be placed in water and left for 24 to 48 hours, then dried for 3 to 4 days. Stratification is optional. Unstratified cuttings should be planted at the end of April or beginning of May at a depth of 15-20 cm. at an angle of 45° inclined towards the south or west. Best results are obtained with cuttings 0·8 to 1·1 cm. in diameter.

3513. Cosmo, I.
A che punto siamo con l'impiego di sostanze ormoniche nell' industria vivaistica viticola? **(The use of hormones in vine nurseries.)**
Riv. Vitic. Enol., 1952, **5**: 266-7, bibl. 5.
In a note reviewing his own and other trials the author concludes that at present the use of root stimulants for vine cuttings should be limited to experimental applications.

3514. Capucci, C.
Le barbatelle di due anni nelle piantagioni viticole. **(Two year old cuttings in vine growing.)**
Riv. Fruttic., 1951, **13**: 174-94, illus.
Research was conducted for 12 years in Emilia to determine the influence of the age of grafted cuttings on rooting, development and productivity. The scions used on Kober 5 BB rootstocks were Trebbiano romagnolo, Negrettino, Sangiovese piccolo, Sangiovese grosso, Chasselas, Merlot and Montumi. Those used on 420 A rootstocks were Montumi and Trebbiano romagnolo. Two-year-old cuttings rooted less well than one-year-old but gave vines that developed faster and produced higher yields in the early years. Later the rate of growth and productivity gradually fell until they were almost the same as those of vines from one-year-old cuttings. [See also *H.A.*, 8: 1009, and 10: 82.] Twelve years' experience showed a slight superiority in the vines worked on 1-year-old stocks.

3515. Kelarev, M. P.
An improved method of raising vines. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 3, pp. 30-1, illus.
It is shown that rooted layers of vines not only produced strong planting material, but also bore fruit during their first year of growth, before being separated from the mother plant.

3516. Branas, J.
Historique sommaire, situation actuelle, objectifs généraux et moyens de la reconstitution des vignobles. **(Historical summary, present position, general objects and means of reconstituting vineyards.)**
Bull. Off. int. Vin, 1950, **23**: 237: 27-49.
This general report briefly describes the invasion of Europe by *Phylloxera*, its control by grafting on resistant American vines and the breeding of resistant hybrids, and what these measures entail. The primary objects and methods of reconstituting vineyards are summarized.

3517. VIth International Vine and Wine Congress.
Historique sommaire, situation actuelle, objectifs généraux et moyens de reconstitution des vignobles. **(Historical summary, present position, general objects and means of reconstituting vineyards.)**
Bull. Off. int. Vin, 1950, **23**: 237: 84-125, 1951, **24**: 239: 37-69; **24**: 240: 11-20.
Being national reports with regard to Algeria, Luxemburg, Morocco, Portugal, Switzerland, Tunisia, Turkey, Germany, France, Peru and Jugoslavia.

3518. DALMASSO, G.
Reconstitution des vignobles par le greffage sur les vignes américaines; organisation des pépinières; porte-greffes; greffe; affinité; greffage sur vignes américaines. **(Reconstitution of vineyards by grafting on American rootstocks; nurseries; rootstocks; scions; compatibility; grafting on American rootstocks.)**
Reprinted from *Bull. Off. int. Vin*, 1950, **23**: 237: 50-83, as a separate by Imprimerie Alençonnaise, Alençon.

This general report on the reconstitution of vineyards affected by phylloxera by the use of American vines as rootstocks is compiled from the national reports of countries attending the VIth International Vine and Wine Congress, Athens, 1950. The subjects covered are the organization and control of nursery production and produce, directly or indirectly, by States, the chief stocks used and the techniques of cultivation, the vexed question of affinity between scion and stock, the effects of grafting on the length of life of vines, the relative importance of the bench-grafting of rooted cuttings and grafting at stake in the field, and woody and herbaceous grafting.

3519. VITH INTERNATIONAL VINE AND WINE CONGRESS.
Reconstitution des vignobles par le greffage sur vignes américaines. Organisation des pépinières, porte-greffes, greffes, affinité, greffage sur vignes américaines. **(Reconstitution of vineyards by grafting on American vines: nurseries, rootstocks, compatibility, and grafting on American stocks.)**
Bull. Off. int. Vin, 1951, **24**: 239: 70-112; **24**: 240: 21-116; **24**: 241: 19-37.

Reports are given of relevant work in Algeria, Germany, Austria, Spain, U.S.A.; Cyprus, France, Greece, Italy, Israel, Luxemburg, Morocco, Portugal; Switzerland, Tunisia and Turkey.

3520. PONCE, J. R., AND ZULUAGA, P. A.
Contribución al estudio de la biología floral de la vid en Mendoza. **(A contribution to the study of the floral biology of the vine in Mendoza.)** [English and German summaries ½ p. each.]
Rev. Fac. Cien. agrar. Mendoza, 1950, **2**: 37-51, bibl. 13, illus., being *Publ. Inst. Vino, Univ. nac. Cuyo* **7**, [received 1952].

The degree of self-compatibility is tabulated for the 114 vine varieties grown at the National University of Cuyo, Argentina, in the 2 years 1949 and 1950. The floral morphology of each variety was studied and a correlation established between the morphological characteristics and the degree of self-compatibility. On the basis of the results, the varieties were classified into 6 floral types, as follows: (1) staminate flowers, functionally male with atrophic pistils; (2) pistillate flowers, functionally female, with short, spiral stamens; (3) flowers functionally female, but occasionally hermaphrodite; (4) flowers functionally hermaphrodite, imperfect, with thin stamens, shorter than normal and sometimes spiral; (5) hermaphrodite flowers, functionally perfect, with normal stamens and pistil; and (6) hermaphrodite flowers with imperfect pistil and ovules that give rise to parthenocarpic fruits. The improvement of imperfectly fertile varieties by clonal selection is proposed.

3521. LALATTA, F.
Cimatura e altre pratiche per ostacolare la colatura del Riesling Renano. **(Clipping and other treatments to prevent flower drop in Riesling vines.)**
Riv. Fruttic., 1952, **14**: 20-27, bibl. 11.

In experiments in the Pavia district in 1949-50 on Rhone Riesling vines grafted on Kober 5BB, shoot-pruning had a considerable effect in preventing flower drop due to excessive vegetative vigour. Ring-barking had a similar effect.

3522. BARNES, M. M., HEMSTREET, C. L., AND TURZAN, C. L.
Pruning-time studies on grapes.
Calif. Agric., 1952, **6**: 2: 6, 14, illus.

If head pruning (removal of the apical portion of the previous year's cane) of vines in southern California is done early (November) or late (March) the plants commonly leaf out later in the spring than when pruning is done in mid-winter. It has been shown that late or early pruning may markedly reduce the growth abnormalities included under the term "grape bud mite injury", which has hitherto been attributed to the mite *Eriophyes vitis*. In a large trial on Mataro vines half the plants pruned in November, December, January or February, 1949-50, were pruned the following winter in the same months while with the other half those that had been pruned in favourable months were now pruned in unfavourable and *vice versa*. In both years the vines pruned in January or February gave much reduced yields and showed a higher incidence of "grape bud mite injury". The effect of a favourable pruning time was enhanced following a low yield, and that of an unfavourable pruning time following a high yield. These results suggest that the principal cause of "grape bud mite injury" is physiological, although the mite may cause disturbances showing similar symptoms.

3523. SKUINJ, K. P.
A semi-fan form for vines. [Russian.]
Sad i Ogorod, 1952, No. 6, pp. 45-8, illus.

A method of training grape-vines, said to be superior to the ordinary fan-form, is a semi-fan arrangement which is described and shown diagrammatically with the method of pruning indicated. In each plant a number of main stems (up to 4 or 5) of different lengths are retained and prolonged in one direction only, and the young shoots which develop from them are more uniformly distributed than in the ordinary fan-form. Advantages are an increased yield in the first two years of bearing, and the facilitation of certain cultural operations.

3524. MALAN, A. H.
Effect of nitrogen and irrigation on Waltham Cross grapes.
Fmg S. Afr., 1952, **27**: 291-2, 294.

In some seasons a high percentage of seedless berries produced by Waltham Cross vines may make a considerable proportion of the crop unsuitable for export

or for local consumption as table grapes. To determine whether N or irrigation might affect this percentage, a trial was carried out over 3 years in which either N or irrigation or both were applied to vines growing in fertile soil 3-4 weeks or 8-10 days before flowering. As compared with untreated controls neither N nor irrigation had any effect, although as regards irrigation this was to be expected in view of the adequate rainfall at this season in each of the 3 years. The proportion by weight of seedless berries was higher in the first year than subsequently and it is suggested that this may have been associated with early (July) pruning of bearers in that year, whereas in the next two years pruning was done in September, after the flowering stage.

3525. Tavadze, P. G.
The influence of cultural measures on the pigments of grape vine leaves. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 5, pp. 31-3, bibl. 1.

Data obtained in trials in Georgia show that among the conditions favourably influencing pigments, particularly chlorophyll, in vine leaves are a two-branched training system, soil of 40-60% saturation, and spacing to give 13,333 vines per ha. on well manured soils. The chlorophyll content is at its highest after fruit set in leaves growing along the middle of the shoots. Apart from its effect on vigour and productivity a high chlorophyll content has a beneficial effect on the frost resistance of vines.

3526. Contardi, H. G., and Pimenides, A. C.
Transpiración y formación de materia seca en vid. **(Transpiration and formation of dry matter in vines.)** [English summary ½ p.]
Rev. Fac. Cien. agrar. Mendoza, 1950, **2**: 13-20, bibl. 10, illus. [received 1952].

Experiments were carried out in the province of Mendoza, Argentina, to determine the transpiration coefficient of the vine varieties Malbeck and Semillon. The amount of dry matter formed by both varieties during the 1949-50 season was determined, and the data were related to previous observations made on the amount of water transpired by the vine during one biological cycle [see *H.A.*, 21: 3348]. It was established that in order to elaborate 1 kg. of dry matter the variety Malbeck must transpire 405 l. water and Semillon 359 l. water.

3527. Garoglio, P. G.
Ulteriores contribuciones al estudio refractometrico y quimico de las distintas zonas del grano de uva, durante el periodo de madurez. **(Further contributions to the refractometric and chemical study of the different zones of the grape during maturation.)** [English, French, German and Italian summaries ¼ p. each.]
Experimenta, 1949, **2**: 4-23, bibl. 13.

Three zones are recognized: (1) the outer zone just below the skin; (2) the pulp; (3) the central zone round the seeds. Refractometric data are given for the 3 zones for 15 varieties at 3 stages of maturity in the 1948-49 season near Cuyo. The relationship between the refractive indices and the content of sugar and acids, the influence of the non-sugar constituents of the juice on the refractive index, and the sugar and acid contents of the juice obtained at different stages of pressing are indicated.

3528. Vryonides, P.
Raisin making and marketing.
Countryman, Nicosia, 1951, **5**: 8: 12-13.

The grape varieties used for drying in Cyprus are Local Red and Local White (Xynisteri) and to a lesser extent Sultana, Malaga, and Rozaki. Production in 1950 rose to 7,250 tons but no effort was made to improve quality. Advice is here given on time of picking, preparation of cold dip solutions, dipping and storage.

3529. White, L.
Dried vine fruit [in Australia].
Quart. Rev. agric. Econ., 1951, **4**: 102-5.

During 1950 the Bureau of Agricultural Economics made a survey of the average cost of producing sultanas, currants and lexias by 129 representative growers in the main producing areas of Australia, and found it to be £60·78 per ton. The items that made up this total are tabulated, as is the range of growers' costs encountered. Other factors analysed include yields per acre over 5 years for 4 areas and for the 3 types of dried fruit, and production costs in relation to size of vineyard. The survey indicated that the dried vine fruit industry is apt to be severely affected by adverse climatic conditions and its large scale expansion in climatically unreliable areas might well prove disastrous.

Nuts.

(*See also* 3538a, c.)

3530. Solignat, —., and Venot, —.
Multiplication végétative du chataignier. **(Vegetative propagation of the chestnut.)**
C.R. Acad. Agric. Fr., 1952, **38**: 263-6.

A method is described of propagating chestnuts by cutting back the stems and layering the shoots which arise at the base. The required variety is first multiplied by grafting on a rootstock. The current year's shoots arising from the scion are each encircled at the base in June with a steel wire ring. In July the shoots are earthed-up so that the wire ligature is covered with 20-25 cm. of soil. The layers so obtained can be used as parent plants for further layering or they may be planted out in the nursery. There is some variation in the degree of success in rooting shown by different species. Varieties of *Castanea sativa* (Spanish chestnut) root more readily than *C. crenata* (Japanese chestnut) varieties, and the latter root better than *C. mollissima* varieties.

3531. Vieitez, E.
Ensayos de reproducción vegetativa de híbridos de castaño (*Castanea sativa* × *Castanea crenata*). **(Experiments in the vegetative propagation of chestnut hybrids (*Castanea sativa* × *C. crenata*).)** [English summary 1 p.]
An. Edaf. Fis. veg. Madrid, 1952, **11**: 185-209, bibl. 23.

The chestnut plantations in Galicia, Spain, are declining as a result of disease, mainly caused by *Phytophthora cambivora*. *C. sativa* × *C. crenata* hybrids show resistance in the F_1 generation, but this resistance is lost

in the F_2 generation; the vegetative propagation of these hybrids is therefore desirable. Chestnut cuttings normally root with great difficulty, so a series of trials was designed to determine the best method of inducing rooting. The treatments for hard wood cuttings included application of growth substances at different strengths, application of minor elements, and exposure to 0° C. for 27 days. Treatments of soft wood cuttings included taking cuttings at different times of year, application of growth substances, and application of organic nutrients. In no case was rooting obtained. Cold treatment appeared detrimental to the hard wood cuttings. The best shoot development was obtained with the minor element treatment. The soft wood cuttings lived longest and callused best when taken from mother plants with well developed fruits, treated with growth substances, and sprayed daily with Knop's modified solution with 50 mg. asparagine, 50 mg. dl-α alanine, 2·5γ zinc sulphate and 80γ sucrose added to each litre. It is concluded that tests with stronger concentrations of growth substances and better control of the external factors affecting root formation are desirable.

3532. KUROKAMI, T., AND OTHERS.
Studies on the development of keeping quality of chestnut fruits by delaying their germination with phytohormone treatments (IV).
[Japanese with English summary ½ p.]
Tech. Bull. Kagawa agric. Coll., 1950, **2**: 39-49, bibl. 8, illus.

A temperature of 10° C. appears to be critical for the germination of chestnuts. The retarding effect of 2,4-D increased with concentration at 10° C. or above. A large proportion of untreated seeds germinated at the end of January when temperatures rose above 10° C. High concentrations of 2,4-D resulted in reduced germination or in inhibition or deformation of stem and root growths. The inhibited seedlings contained more sugar and showed higher amylase activity than untreated plants making strong growth. Packing in sawdust treated with 2,4-D in December maintained a high concentration of the hormone until May. [For previous articles see *H.A.*, 20: 640 and 22: 2267.]

3533. BLONDEL, L.
La meilleure methode de greffage du pacanier. **(The best method of grafting the pecan.)**
Fruits et Prim., 1951, **21**: 273-4, illus.

From trials of various methods of grafting pecans, *Carya olivaeformis*, the author concludes that the best for plants up to 3 years old is ring grafting, by which a ring of bark is removed with a double-bladed knife from the rootstock plant and replaced by a similar ring of bark, bearing a bud, taken from the scion variety. The method gave an average of 72·4% success with 4 varieties.

3534. BEALE, C.
Potash for pecans.
Bett. Crops, 1952, **36**: 4: 47, illus.

In Florida pecan trees receiving 5 lb. of muriate of potash produced an average yield of 25·2 lb. of nuts compared with 19 lb. produced by trees grown without K. Trees of the Moore variety that received K suffered less damage from low temperatures than unfertilized trees.

3535. MORELLI, A.
Uno sguardo alla coltivazione del noce nelle Venezie. **(Walnut growing in Venezia.)**
Agric. Venezie, 1952, **6**: 366-76.

In Venezia the walnut tree provides nuts, timber and fuel and is at its best at elevations of from 200 to 1,000 m. The varieties are mainly of local importance only. They are chiefly grown in pastureland and receive little attention. Propagation is generally by grafting natural seedlings. Limited formation pruning and annual prunings of dead wood are given, and sometimes the trees are heavily pruned for fuel. Fruiting begins at 10-15 years old and the yield increases up to the age of 60. The average annual yield during the fruiting cycle is 20 kg. The chief fungal and insect pests are *Gnomonia juglandis* (leaf blotch), *Microstoma juglandis*, *Armillaria mellea*, *Cossus* moth, *Carpocapsa splendana*, *Melolontha melolontha* and *Polyporus* spp.

3536. BRIERLEY, W. G., AND HODGSON, R. E.
Growing nut trees in Minnesota.
Minn. Hort., 1952, **80**: 4-5, 15, 30-1, 46-7, 62-3, bibl. 5, illus., being Pap. *Minn. agric. Exp. Stat. misc. J. Series* **759**.

The chief species are black walnut (*Juglans nigra*) and the hickories (*Carya ovata* and *C. cordiformis*). Their more important varieties are named. Planting and cultural methods are briefly described. Propagation is usually by side or side-cleft grafting with scions bearing 2-3 buds in mid-May.

3537. MAURER, K. J.
Ein Beitrag zur Gewinnung bewurzelter Abrisse bei einigen Juglansarten. **(The propagation of *Juglans* spp. by layers.)**
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 187-9, illus.

In trials at Geisenheim, Germany, the highest percentage of rooted shoots from stools was obtained with *Juglans sieboldiana*. *J. mandschurica* and *J. cinerea* were about equal in their rooting response, while the results with *J. regia* var. *monophylla* were unsatisfactory and other methods of rooting are being sought.

Noted.

3538.

a AUGUSTE, A.
L'amandier en Algérie. **(The almond in Algeria.)**
Bull. Gouv. gén. Algér., Serv. Arb. **145**, 1950, pp. 30, from abstr. in *Fruits d'Outre Mer*, 1952, **7**, Suppl. p. 54.
Requirements, varieties, cultivation, harvest and economics.

b BAKER, R. E.
Inheritance of fruit characters in the strawberry.
J. Hered., 1952, **43**: 9-14, bibl. 2, illus.

c BRYDEN, J. D.
Nut trees are profitable.
Fruit World, Melbourne, 1951, **52**: 6: 13.
Nut species and varieties suitable for cultivation in New South Wales.

d DURQUETY, M., AND BISSON, J.
Étude ampélographique des sarments de certains cépages français du Sud-Ouest. **(A study of the canes of certain vine varieties grown in S.W. France.)**
Imprimerie C. Déhan, Montpellier, [1952], pp. 11, bibl. 3.
See *H.A.*, 22: 1281.

e HYAMS, E.
Perpetual large-fruited strawberries.
Gdnrs' Chron., 1951, **130**: 178-9.
See also *H.A.*, 22: 215.

f LEVADOUX, L.
Essai provisoire de synonymie ampélographique. (A **provisional study of synonymy in grape varieties.**)
[*Publ.*] *Inst. nat. Rech. agron.*, 1952, pp. 12.
In the middle basin of the Garonne.

g MINISTRY OF AGRICULTURE, LONDON.
The loganberry.
Adv. Leafl. Minist. Agric. Lond. **129**, 1952, pp. 5, illus., 2d.

h STAUDT, G.
Über Fragen der phylogenetischen Entwicklung einiger Arten der Gattung *Fragaria.* **(On some problems concerning the phylogenetic development of certain *Fragaria* spp.)**
Züchter, 1951, **21**: 222-32, bibl. 40, illus.

i STUART, G. M.
Descriptive notes on varieties of soft fruits.
Reprinted from *Roy. Caledonian hort. Soc. J.*, 1951, No. 6, as *Misc. Publ. Edinb. Coll. Agric.* **88**, 1951, pp. 6.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 3263, 3713m, 4503, 4510, 4516, 4523, 4527, 4546, 4547, 4561, 4564d.)

3539. BIOLOGISCHE ZENTRALANSTALT FÜR LAND- UND FORSTWIRTSCHAFT IN BERLIN-DAHLEM.
Pflanzenschutz-Tagung der Biologischen Bundesanstalt Braunschweig in Würzburg, 23.-25. Oktober 1951. **(Plant protection conference of the Biologische Bundesanstalt Braunschweig, at Würzburg, 23-25 October 1951.)**
Mitt. biol. Zentralanst. Berlin-Dahlem **74**, 1952, pp. 168.

The following [translated titles] were among the papers read at the plant protection conference.

Hus, P. The organization of disease and pest forecasts in the Netherlands, pp. 6-11.

Klinkowski, M. The possible use of antibiotics for the disinfection of bean seed affected by halo blight, pp. 19-22.
[Crude penicillin and streptomycin appeared promising.]

Müller, H. The action of cyanamide in calcium cyanamide on several groups of microorganisms, especially pathogenic soil fungi, pp. 23-7.
[Cyanamide had an inhibiting effect on *Rhizoctonia solani*, *Pythium debaryanum*, and some other fungi.]

Czech, M. Recent investigations on injuries to agricultural plants by chlorine, nitrosylsulphuric acid and sulphur dioxide gases, pp. 27-32.
Peas and early potatoes were among the crops studied.

Nolte, H.-W. A study on the material causes of nematode injury, pp. 40-2, bibl. 3.
[*Pratylenchus pratensis* in *Primula malacoides* was shown to produce a toxin which causes wilting.]

Pape, H. Experiences gained in the hot water treatment of lilies of the valley, pp. 45-9, illus.

Duspiva, F. The effect of H-ion concentration on the action of winter washes, pp. 62-8, bibl. 6.

Reich, H. On the control of apple aphid and fruit tree red spider, pp. 72-5.
[Presenting the results of some trials carried out at Jork.]

Roesler, —. Red spider mite species infesting fruit trees in the Palatinate, pp. 75-7.

Hochapfel, H. On apple mildew control, pp. 77-81, illus.

Hochapfel, H. The significance of boron for the culture of apple seedlings in relation to soil sickness, pp. 82-6, illus.

Ehrenhardt, H. The effect on cultivated plants of the γ-isomer of BHC applied in various forms, pp. 116-22, illus.
[The plants studied included lettuce, tomato and vine.]

Dosse, G. The effect of DDT, phosphoric ester and BHC preparations on *Coccinella septem-punctata* in aphid control, pp. 125-7.

Thate, R. Testing the action of new spray apparatus by means of fluorescent substances, pp. 145-6.
[The fluorescent substances make the distribution of the spray cover visible.]

Scharmer, J., and Singer, G. Experiences gained in the spraying of fruit trees by mist blowers, pp. 147-56.

3540. ROSE, D. H., MCCOLLOCH, L. P., AND FISHER, D. F.
Market diseases of fruits and vegetables. Apples, pears, quinces.
Misc. Publ. U.S. Dep. Agric. **168**, revised 1951, pp. 72, bibl. 145, illus., 55c.

This is a revision of the original (1933) publication and it is designed to aid in the identification of diseases and disorders affecting apples, pears and quinces during marketing. Some 57 conditions of apple, 25 of pear and 5 of quince, due to insect and fungal attack and other causes such as boron deficiency, bruising, chemical and washing injury, freezing and scald, are dealt with in relation to occurrence, symptoms, effects, cause and control. There are sections on care during and after

harvest and on the effect of removing spray residue. There are 14 coloured plates, each consisting of 8 illustrations.

3541. Anon.
Les principales maladies du raisin cultivé sous verre et les moyens de les combattre aux Pays-Bas. **(The principal diseases of vines cultivated under glass and their control in the Netherlands.)**
Bull. Off. int. Vin, 1951, **24**: 244: 115-16.
Notes are given on *Tetranychus urticae*, thrips, *Eulecanium corni*, *Pulvinaria vitis*, oïdium, *Botrytis cinerea*, Alicante disease (death of the roots of Black Alicante), chlorosis, and *lamsteligheid* (browning and drying of the peduncles).

3542. Flipse, L. P.
Handleiding bij de bespuiting van fruitgewassen. **(Guide to the spraying of fruit trees.)**
Meded. PlZiekt. Dienst **86**, 5th edition 1952, pp. 63, Fl. 1.
In this growers' bulletin, which has now been brought up to date, practical advice is given on the control of the more important fruit tree pests and on the use of the various spray materials. Notes are also given on such subjects as legislation, effect of sprays on bees, spreaders, and mist spraying.

3543. Colby, A. S.
Fertilizing and spraying small fruits.
Trans. Ill. St. hort. Soc. for 1951, 1952, pp. 300-8.
Fertilizer recommendations for Kentucky and Illinois are given. The value of ferbam in control of raspberry anthracnose, grape black rot and grey mould of strawberries is noted. For insect control in small fruits DDT, chlordane and 88R were found effective. Various experiences in the use of herbicides are recorded, and the technique of applying Crag Herbicide 1 is described.

3544. Rui, D.
La difesa fitopatologica di attualità della vite. **(Vine protection today.)**
Riv. Vitic. Enol., 1952, **5**: 39-51, illus.
The 3 great problems of today in Italy are the control of the grape moths, peronospora and oidium. Damage by *Clysia ambiguella* and *Polychrosis botrana* larvae depends largely on local climates and microclimates and varies with season and place. Recent research shows that *Clysia* eggs are only laid at temperatures of 20-25° C. and relative humidities of 70-90%, and that they soon die if exposed to temperatures over 32° C. but develop at temperatures of 20-28° C., whatever the R.H. *Polychrosis* prefers higher temperatures and a lower R.H. Control of adults is obtained by putting out vessels containing thin wine with sugar and oil added, in which the insects drown. Control of the larvae is obtained by careful spraying of the inflorescences with DDT, HCH, phosphoric esters or arsenicals, but arsenates should not be used near harvesting time. *Peronospora:* Spraying with bordeaux mixture is recommended from about mid April until the end of July at intervals varying with weather conditions. The concentration used should be increased as the season advances. *Oidium:* For oidium, which is much more serious than peronospora in Italy, wettable sulphur is recommended.

3545. British Standards Institution, London.
British standard recommended names for pest control products.
Brit. Standard. **1831**, part 1, 1952, pp. 14, 2s. 6d.
The recommended common names of 13 insecticides, including insect repellents, acaricides and nematocides, 5 fungicides and 5 herbicides already in widespread use, are tabulated with chemical name, chemical formula, remarks and other names.

3546. Frost, S. W.
Light traps for insect collection, survey and control.
Bull. Pa agric. Exp. Stat. **550**, 1952, pp. 32, bibl. 133, illus.
A review is given of the history and development of light traps. They are successfully and extensively used for collection and survey purposes but have never been very satisfactory as a means of pest control. Thanks to the development of more powerful lamps and ultraviolet light, however, interest in them for pest control has recently increased. They are usually designed for specific groups of insects. Types of trap for different purposes are described and illustrated.

Disturbances of nutrition or of unknown origin.

(*See also* 3274-3276, 3427, 3713b, h, 3755, 3756, 3788-3790, 3833-3835, 3872, 3895-3902, 4152, 4223, 4243, 4337, 4391.)

3547. Kobernuss, E.-C.
Untersuchungen zur Ursache und Behebung der Bodenmüdigkeit bei Obstgehölzen. **(On the cause and control of soil sickness in fruit trees.)**
Kühn-Arch., 1951, **64**: 365-408, bibl. 77, illus.
Apple, pear and plum seedlings grown in nutrient solutions without boron developed abnormally and showed reduced growth rate of stem and roots, stunting, and swelling of the root tips. No similar symptoms appeared when 11 other trace elements were omitted. Since fruit trees growing in " sick " soils showed the same symptoms as seedlings raised in no-B solutions it was presumed that a deficiency of available B is the cause of soil sickness in general. This was borne out by experimental B applications in the field which cured affected trees or greatly improved their condition within one season. The assumption is supported by the following observations: (a) In dry, heavy soils with a high lime content and consequently low B availability, sickness occurs earlier and more markedly than in lighter soils; (b) the trouble hardly occurs in soils with a high or changing water table where B is kept in solution; (c) the brook silt soils of the Altenland, near Hamburg, which are rich in B, have proved not to be subject to the malady. Moreover, it has been reported to the author that 2 cm.-deep applications of this soil to " sick " plots induced healthy plant growth in the nursery. Her own observations and measurements, as well as further evidence adduced from the literature, led to the conclusion that there is

only one type of soil sickness, viz. that due to B deficiency, though symptom expression may vary. Trials carried out so far show that soil sickness in nurseries is remedied or considerably alleviated by B applications at the following rates per hectare: (1) for stool beds, 15-30 kg. boric acid or 20-40 kg. borax; (2) for grafted or budded trees, 20-40 kg. boric acid or 30-60 kg. borax. The boron should be applied in early spring by spreading on the soil surface, possibly using sand or wood ash as a carrier, and then working it in.—Inst. Obst- u. Gemüsebau, Univ. Halle-Wittenberg.

3548. Refatti, E., and Ciferri, R.
Defogliazione, flittene della scorza, rachitismo e necrosi su meli, nella regione Trentino-Alto Adige da borocarenza. **(Defoliation, bark measles, stunting and bark necrosis of apple trees caused by boron deficiency in the region Trentino-Alto Adige.)** [English summary 6 lines.]
Not. Mal. Piante, 1952, No. 18, pp. 1-20, bibl. 20, illus.
Borocarenza sul melo. **(Boron deficiency in apple.)**
Ital. agric. 1952, **89**: 182-8, bibl. 8, illus.

Symptoms similar to those attributed in the United States to boron deficiency, and usually associated with potash deficiency, have been observed on apple trees in Italy, and are here described in detail. The symptoms vary somewhat but start as a deformation and necrosis of leaves on the apical branches of the head, particularly in its central part, followed by defoliation. The buds of affected branches wither and rosettes of leaves develop. There is also a brown discoloration and necrosis of the phloem and cambium. Soil treatment with borax or boracic acid (preferably together with potash and zinc salts) prevents or stops the disease. A connection between boron deficiency and frost damage is suspected.
The second article is a shortened version of the first.

3549. Jones, J. O., and Dermott, W.
Copper deficiency in pears.
Agriculture, Lond., 1952, **59**: 35-7, bibl. 4, illus.

The symptoms of severe Cu deficiency seen in young pear trees on a sandy soil in a nursery in north-west Surrey are described. Differences in the apparent degree of susceptibility are indicated for 15 varieties, most of which were growing on quince A rootstocks. In a control experiment spraying with 0·075% $CuSO_4$ in May was much more effective and raised the Cu content of leaves more than spraying with 4% $CuSO_4$ or 10–15–100 bordeaux mixture in February or than a winter soil application of $CuSO_4$ at 30 lb. per acre.

3550. Jacobsen, I.
Om planternes manganindhold som hjaelpemiddel ved bestemmelse af mangan-mangel. **(The manganese content of plants as a guide to the assessment of manganese deficiency.)**
Horticultura, 1951, **5**: 89-97, bibl. 18.

The leaf samples analysed in this study were collected from crop plants—among them apple and potato—of 3 types: (1) healthy plants, (2) plants showing slight manganese deficiency symptoms and (3) plants showing severe manganese deficiency symptoms. Particular care was taken to gather the samples from as small an area as possible so as to ensure identical environmental conditions. Tabulated data are presented on the relation between Mn content in the soil and Mn content in the leaf and on the relation between Mn deficiency symptoms and leaf Mn % dry matter. The Mn % D.M. for leaves of slightly deficient plants was considerably lower than that for leaves from plants exhibiting severe deficiency symptoms, and in many cases the value for the latter was even higher than for leaves of healthy plants. Thus, the curve expressing the correlation between leaf D.M. production and Mn uptake by the plant is S-shaped. Or conversely, a U-curve is obtained for the equation Mn uptake $\times 100 \div$ leaf D.M. For apple leaves collected from the same tree near Aslev, the following values were recorded for the first sample: (1) healthy, 3·10 mg. Mn/100 g. D.M.; (2) with slight deficiency symptoms, 1·60 mg. Mn; (3) with severe deficiency symptoms, 4·90 mg. Mn; the corresponding figures at a later sampling being 3·95, 2·75 and 6·60 mg. Mn/100 g. D.M. respectively. Analyses of potato leaves yielded similar results. These findings suggest caution in the interpretation of leaf analysis figures as a guide to the diagnosis of mineral deficiency.—Roy. vet. agric. Coll., Copenhagen.

3551. Iljin, W. S.
Metabolism of plants affected with lime-induced chlorosis (calciose). II. Organic acids and carbohydrates.
Plant and Soil, 1951, **3**: 339-51, bibl. 8.

In studies on 17 plant species, including grape, apple, cherry and woody and herbaceous ornamentals, modifications reflected in differences between normal and chlorotic foliage in content of certain organic acids and carbohydrates were found to be correlated with those in certain nitrogenous components described in the first paper [*see H.A.*, 22: 1315]. In those plants which form citric acid its elaboration was directly correlated with severity of chlorosis. The metabolism of malic and tartaric acid was modified to a less marked extent. The content of unidentified acids was largest in the most severely chlorotic leaves. The total organic acid content of the leaves of the chlorotic woody plants tested always exceeded that of healthy ones. The metabolism of the organic acids seemed to be directly correlated with the concentration of soluble Ca in the sap. As the result of impaired translocation the carbohydrate content of diseased foliage sometimes exceeded that of healthy foliage in some species (e.g. apple), despite changes involving chlorophyll.

3552. Iljin, W. S.
Metabolism of plants affected with lime-induced chlorosis (calciose). III. Mineral elements.
Plant and Soil, 1952, **4**: 11-28, bibl. 37.

This report adds to the information given in two earlier papers [see *H.A.*, 22: 1315 and 3551] by showing the differences in the mineral content of the leaf sap in chlorotic and normal plants. The salt content of chlorotic leaves was found to be generally higher than that of normal leaves and fluctuated irregularly throughout the growing season. The K content was higher in chlorotic than in normal leaves; in normal leaves it decreased throughout the growing season,

whereas in chlorotic leaves it showed a marked increase in midsummer. Chlorotic leaves usually contained more Ca than healthy ones. Mg occurred only in small amounts in all the plants studied except one, and there it increased with chlorosis. The difference between the P content of chlorotic and healthy leaves was insignificant except in grapes, where again the chlorotic leaves contained the higher amount. The Fe content of the chlorotic plants varied and no apparent correlation was found between iron deficiency and lime-induced chlorosis. It is assumed that the entire metabolism of plants affected with lime-induced chlorosis is disturbed, not merely those metabolic processes related to the formation of chlorophyll and other pigments.

3553. COOMBE, B. G.
Grape yields increased by zinc swabbing.
J. Dep. Agric. S. Aust., 1952, **55**: 456-7.

Many vines which may not show any obvious " little leaf " symptoms may still give increased yields after zinc treatment. Apart from occasional yellow leaves, the only symptoms of this obscure type of zinc deficiency seems to be decreased yield, and young vines not obviously affected with " little leaf " may remain stunted unless swabbed with zinc after pruning. A mixture of 2 lb. of zinc sulphate in 1 gal. of water is brushed on to each fresh pruning cut. Agricultural zinc is cheap and quite satisfactory. It is essential to swab within a few hours of pruning, otherwise no response is obtained. One gallon of the solution is sufficient to swab one acre of vines.

3554. HEWITT, W. B.
Some responses of grapevines to sodium arsenite spray applied for black measles control.
Phytopathology, 1952, **42**: 158-61, bibl. 4.

Black measles of the grapevine, the cause of which is unknown, is characterized by black spotting of the skin of the berries along with a form of interveinal leaf burn. Spot treating the black measled vines only, in a vineyard, with sodium arsenite solution during the dormant season did not reduce the incidence of disease, but spraying all vines reduced the disease by an average of over 50%. A dormant spray of sodium arsenite on Thompson Seedless vines at concentrations of 1·5, 2·5 and 3·5 lb. As_2O_3 per 100 gal. water significantly reduced the number of measled vines. The difference between any two of the three sprays was not significant, but the totals of the three replications in each treatment showed decreases of 47, 58, and 64% in diseased vines with each increase in arsenite concentration. There was an increase of 22% measled vines in the nonsprayed plots. Spraying entire vines gave better control than spraying only one side, and spraying after pruning gave better control than spraying before.—Univ. Calif.

3555. RUI, D., AND ROSTIROLLA, G.
Accertamenti sintomatologici e statistici sulla leptonecrosi del pesco. **(Peach leptonecrosis; symptoms and statistics.)**
Agric. Venezie, 1951, **5**: 303-11, illus.

Peach leptonecrosis is widespread in northeastern Italy. The symptoms are less evident in summer than in spring and autumn. External symptoms in autumn (when a full symptomatic picture is usually presented) are reduced vegetative development, chlorosis between the veins, rolling parallel with the main vein, enations on leaf surface, contortion of leaf apex and, in the late stage, necrosis of leaf tip and margin, bark darker than normal and showing tiny vertical and horizontal cracks from which gum exudes. Internal symptoms in autumn are drying and darkening of the inner bark with necrotic spots, darkening of the wood especially at the junctions of branches. Four stages of the disease are recognized, viz. premonitory, initial, intermediate or acute, and death. A list is given of some 80 susceptible varieties of peach.

3556. CIFERRI, R.
Descrizione della malattia del tipo leptonecrosi dell'olivo nelle Marche con facies dominante a scopazzi. **(The description of a leptonecrosis of the olive in the Marche notable for its witches' broom symptoms.)**
Olearia, 1952, **6**: 69-74, bibl. 6.

The disease reported here has many points of similarity with the disease already reported in other parts of Italy, but differs by showing early and extreme witches' broom formation, the absence of discoloration in the upper half of the leaf and of cortical pustules and corky spots on the branches. It produces large amounts of resin beneath the bark of mature branches. It appears on adult trees only and is epidemic in character. Affected plants do not respond to manuring, to boron or to lopping. Virus is suspected as being at least partly responsible.

3557. WOLF, B., AND CESARE, S. J.
Response of field-grown peaches to strontium sprays.
Science, 1952, **115**: 606-7, bibl. 4, illus.

Unthrifty Red Elberta peach trees growing in a loamy sand marked by a low organic matter content and low exchange capacity showed some response to applications of N and several minor elements, but about 20% of the trees continued to show a chlorosis resembling advanced Fe deficiency. Among a large number of nutrient sprays tried, only strontium chloride (0·05% by weight) effected a cure. The ash of normal leaves contained 0·002% Sr and that of chlorotic leaves $\frac{1}{10}$th this amount. The ash of chlorotic leaves also contained only 0·04% Ca compared with 0·9% in healthy leaves, but soil and spray applications of Ca failed to correct the condition. It would be of interest to determine whether the value of relatively large dressings of Ca may sometimes be due in part to the presence of Sr as an impurity.

3558. SCARAMUZZI, G.
Chiarimenti intorno alla clorosi " a dente di sega " delle foglie di pesco. **(The " sawtooth " chlorosis of peach leaves.)** [English summary 4 lines.]
Riv. Ortoflorofruttic. ital., 1952, **36**: 96-9, bibl. 6.

A review is given of available information on the disease, which first appeared in northern Italy and has now been reported in southern Italy. The chlorosis at first appeared to be a virus disease but may ultimately prove to be nutritional in origin. Hale appears to be the most susceptible variety.

3559. Togliani, F.
La clorosi " a dente di sega " delle foglie di pesco. (" **Sawtooth " chlorosis in peach leaves.**) [English summary 7 lines.]
Riv. Ortoflorofruttic. ital., 1951, **35**: 255-8, bibl. 2, illus.

" Sawtooth " chlorosis of peach leaves is fairly common in plants of all ages in the Emilia and Romagna districts. The symptoms are wedge-shaped chlorotic zones on the leaf margins and the leaf apex, often accompanied by the upward curling of the leaf almost into a tube. The cause may be a mild virus (unproved as yet) or nutritional.

Climatic factors.

(*See also* 3265-3270, 3326, 3370, 3371, 3378, 3477j, 3713g, h, 4252, 4253.)

3560. Mann, A. J., Keane, F. W. L., and Lapiņš, K.
Winter injury of tree fruits in British Columbia in 1949-50.
Sci. Agric., 1952, **32**: 173-9, illus., being *Contr. Div. Hort., exp. Fms Serv., Ottawa* **764**.

Approximately 337,000 trees, or about 20% of all fruit trees in the southern interior of British Columbia, were reported killed after the winter of 1949-50, a season outstanding for its prolonged sub-zero weather. A recent tendency for stone-fruit and pear growing to extend gradually northward and for apple growing to expand in the extreme northern end of the region proves, therefore, very hazardous. Forms of injury and the influence of factors such as tree species and variety, rootstock, and location on winter injury are summarized. The findings have been used as a basis for revised tree fruit variety planting recommendations for all districts within the region.

3561. Geslin, H., and others.
À propos des gelées de printemps. Nouvelles observations microclimatiques et biologiques en Champagne (avril 1952). (**Spring frosts. New microclimatic and biological observations in Champagne (April 1951).**)
C.R. Acad. Agric. Fr., 1952, **38**: 228-33.

Records kept in vineyards during severe spring frosts are discussed with regard to (1) choice of ground and experimental layout, (2) microclimatic variations along the slopes, (3) a chart of the isominima and the isometrical lines of damage. The first signs of injury coincided with the isominimum line of −2·5° C.; the limit of maximum damage corresponded on the average with the isominimum of −3·5° C. The critical threshold for the vine, for the stage of development when the first leaves unfold, appears to be around −2·5° C., when observed with reference to the minimum actinothermic index at 0·4 m. from the ground.

3562. Fritzsche, R.
Folgen der Frostnacht vom 2. auf den 3. April 1952. (**Effects of the frost on the night of April 2/3 1952.**)
Schweiz. Z. Obst- u. Weinb., 1952, **61**: 246-7, illus.

The frost [near Wädenswil] on the night of April 2nd, 1952, during which the temperature fell to −10° C. in several places, killed apple fruit buds over a wide area. The death of the main bud activated the axillary buds, many of which blossomed and thus provided a light crop from the trees affected. In some cases the tissues of the style and of the upper part of the ovary were injured. Frost rings on the young fruits are frequent symptoms of this type of damage. In many places blue-violet spots appeared on the under surface of apple leaves, a phenomenon due to the accumulation of anthocyanin in the parenchyma. The iodine test showed that starch translocation did not take place in these leaves which suggests that some of the surplus starch was transformed into anthocyanin. This particular trouble was probably caused by cold weather on and about May 20th and not by the original night frost in April.

3563. Roščin, I. L.
New methods of spring frost control. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 3, pp. 47.

A thick, black smoke produced by burning crude oil covered with coal dust or turf in shallow (45×35×10 cm.) holes dug along the northern and eastern edges of vineyards (depending on the wind) is stated to give very good protection from spring frosts. About 10-15 fires are required per ha.

3564. Collomb, —.
Un procédé automatique de défense contre les gelées de printemps. (Le système Parrenin.) (**An automatic method of protection against late frosts. The Parrenin system.**)
Bull. Off. int. Vin, 1951, **24**: 244: 95-8.

The Parrenin automatic smoke-generating system of protection against late frosts (not black frosts) has been in use in France since 1946 and affords 80% protection. It consists of a battery of 20-l. tanks, generally 12 per ha., containing coal-tar which is lit by electrical means when the temperature falls to 1° C.

3565. Atkinson, J. D.
Oil injury—an unusual cause of death in apricot trees.
Orchard, N.Z., 1952, **25**: 4: 11-13.

Field observations and trials showed that apricot trees will be severely injured if unrefined petroleum oil, such as is used in frost protection burners, is spilt on the bark, although a pot of oil upset under a tree is unlikely to cause damage. The practice of storing empty firepots upside down in the crotches of trees is inadvisable.—D.S.I.R., Auckland.

3566. Barberis, C., and Cordero di Montezemolo, M.
Sul comportamento dei frutteti allagati. (**The behaviour of flooded fruit trees.**) [English and French summaries 6 lines each.]
Riv. Fruttic., 1952, **14**: 57-64, illus.

The behaviour was studied of apples, pears and peaches flooded for different periods in the Ferrara plains. Soil fertility was reduced. Owing to their deeper root systems adult trees suffered more than young ones. Recommended measures are the provision of efficient drainage systems, spring pruning of crowns

to compensate for loss of roots by rotting, immediate cultivation of the soil to favour aeration and renewed microfloral activity, and manuring.

3567. Govi, G.
Una vaiolatura di natura non parassitaria delle foglie di melo. (**A non-parasitic blackening of apple leaves.**)
Riv. Fruttic., 1951, **13**: 195-9, illus.

A non-parasitic leaf spotting in apples has been observed for some time in the lower Po plain. Two distinct types of lesion occur in association: small spots 0·5 mm. in diameter and large ones over 10 mm. The damage is slight but partial defoliation sometimes occurs. The cause is believed to be physiological change due to excessive soil moisture.

3568. Boubals, D., and Huglin, P.
Un dépérissement de la vigne en relation avec la sécheresse. (**A withering of the vine due to drought.**)
Bull. Off. int. Vin, 1951, **24**: 244: 98-9.

Withering of the leaves of vines was observed in 1949 in France and Germany. The symptoms are described. Observations at the National School of Agriculture, Montpellier, led to the conclusion that it was due to the unusually dry weather.

3569. Wilhelm, S., Scott, C. E., and Break, R. A.
Die-back of blackberries.
Calif. Agric., 1952, **6**: 2: 4, 12.

It would appear that a winter die-back of Boysen and Young blackberries is due mainly to lack of winter rainfall and irrigation. Apart from supplying adequate water, it is suggested that only the 5-7 most vigorous canes should be trellised, as soon as possible after harvest, and that these should be tip pruned to 8 to 10 ft. Later when the plants are dormant, lateral growth can be shortened to 8 to 20 buds. A post-harvest application of N is also desirable.

3570. Den Uyl, D.
Windbreaks for protecting muck soils and crops.
Circ. Purdue agric. Exp. Stat., **287**, 1943, pp. 12, illus. [received 1952].

Farm windbreaks of *Salix amygdalina* are described under the following headings: protection afforded, cost, siting, space required, planting method, cultivation and trimming. Other types are briefly mentioned.

3571. Karnatz, H.
Über Windschutzpflanzungen im Obstbau. (**Windbreaks for orchards.**)
Mitt. ObstbVersuchsrings Jork, 1952, **7**: 86-7, illus.

Tree species suitable for windbreaks in the Altenland include Myrobalan and Steinweichsel [a sour cherry], the seeds of which can also be used for rootstock production.

3572. Turjanskiĭ, G. F.
Control of wind erosion on the sands of the Lower Dnieper. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 5, pp. 27-30, illus.

Strong, drying wind is the limiting factor in the cultivation of many, otherwise very suitable, crops in the newly developed areas on the Lower Dnieper. Large afforestation plans are afoot, but meanwhile cultivation with the aid of shelter belts is suggested. A plan of a 96 ha. vineyard is described. It is surrounded by shelter-belts, and is divided into 1 ha. plots each protected by hedges. Tree and shrub species suitable for shelter-belts, according to the depth of ground water, are listed. Planting distances are discussed in detail, and cockchafer control during the first few years of growth is strongly recommended.

Viruses.

(*See also* 3713b, t, w, 4535.)

3573. Lindner, R. C., Kirkpatrick, H. C., and Weeks, T. E.
Ultraviolet absorption spectra as a tool for diagnosing plant virus diseases.
Science, 1952, **115**: 496-9, bibl. 6.

In studies of methods for the detection and diagnosis of viruses in fruit trees it was found that acid hydrolysis of leaf tissue, subsequent to the removal of alcohol-soluble constituents, produced absorption spectra that appeared to be characteristic of the virus diseases studied. The method, which requires the use of a good spectrophotometer, is described. It shows particular promise in the study of latent viruses and virus mixtures and complexes of stone fruits, but can also be used for the detection of viruses of herbaceous plants.

3574. Husz, B., and Klement, Z.
A csonthéjas gyümölcsfák viruszos mozaik-betegsége. (**Virus diseases of stone fruits in Hungary.**) [English and Russian summaries 1¼ pp. each.]
Agrártud. egy.,* 1950, **1**: 83-94, bibl. 13, illus. [received 1952].

Virus infection of stone fruits was recorded in Hungary for the first time in 1948. Symptoms observed since then on apricots, plums and prunes, peaches, and almonds are described and illustrated. Virus on cherries is so far unknown. The economic importance of the diseases, modes of transmission and control measures are discussed.

3575. Stoll, K.
Das Kirschbaumsterben im Baselland. 4. Mitteilung. Über die Verbreitung und die Erscheinungsformen der Krankheit im Jahre 1951. (**Death of cherries in the Canton of Basle. 4th communication. Distribution and symptoms of the disease in 1951.**)
Landw. Jb. Schweiz, 1952, **66**: 255-78, bibl. 42, illus.

The latest survey shows that in the cherry growing parishes Pfeffingen, Muttenz and Aesch respectively, 23·1%, 20·9% and 6·3% of the trees are affected by the Pfeffingen disease, that the virus is still spreading in the Basle area and that infection may occur in all varieties and at any age. A full and illustrated summary is given of earlier symptom descriptions to which new observations by the author are added. From these we quote the following symptoms not mentioned earlier [see *H.A.*, 21: 3383 and 22: 1342] which should be consulted: *Flower:* Later opening of blossom; shorter pedicel, die-back of blossoming branches;

* Formerly *Bull. Fac. Hort. Buda.*

occasionally second blossom in summer, partly with green petals and stamens. *Fruit:* Unripe fruit smaller, oblong, with a rough surface and of irregular shape; premature fruit drop; maturity delayed 10-14 days; flavour sometimes insipid and not typical of the variety; flesh sometimes hard; stalk often short. *Wood:* Cessation of growth after bud burst; lack of vigour; annual ring formation disturbed; blockage of the conducting vessels; canker-like swellings on branches; characteristic leaf clusters and rosette formation. *Root:* die-back of old roots and poor development of rootlets; darker coloration of the bark; vessels blocked by gum. In the absence of any knowledge of the mode of virus transmission other than by infected scion wood or pruning tools the only measures suggested for keeping the disease in check are sanitary and preventive.

3576. JENSEN, D. D., FRAZIER, N. W., AND THOMAS, H. E.
Insect transmission of yellow leaf roll virus of peach.
J. econ. Ent. 1952, **45**: 335-7, bibl. 10.

Yellow leaf roll is similar in some of its symptoms to the more widely distributed but less serious Western-X disease of peaches in California. The fact that *Colladonus geminatus* is a vector of both diseases supports the belief that they are caused by closely related viruses.

3577. PERSONS, T. D.
Phony peach disease—a review of organized control from 1929 to 1951 and the effect of recent developments on future control programs.
From abstr. in *Phytopathology*, 1952, **42**: 286-7.

This is a report of surveys made by the control project in 26 states of the U.S.A. during the past 20 years, progress in regulating nursery stock, and results of commercial orchard control in severely affected areas. Phony infected peach trees were found in 17 states. Observations suggested that reinfection in some cases came from wild plum trees. Present quarantine rules require nursery site approval based on location at least 300 yd. from wild plum, ½ mile from infected commercial orchards, and ¼ mile from urban areas. Control in commercial areas is effective if diseased tree roguing is practised annually on an area-wide basis.

3578. BRUER, H. L., AND SHEPARD, C. E.
Wild plum in relation to the control of phony disease.
From abstr. in *Phytopathology*, 1952, **42**: 282.

In a survey by the acid test method the phony disease was found in wild plums in nine States, positive reactions being obtained from 4 species of native plum: *Prunus angustifolia*, *P. injucunda*, *P. munsoniana*, and *P. umbellata*. Area of disease occurrence in wild plum roughly coincides with that of occurrence in peach but is not contingent upon proximity of diseased peach orchards. Zones of high, moderate, and low disease incidence are also roughly coincident for the two hosts. Spread from plum to peach is frequent in zones of general disease occurrence. Wild plums should therefore be eliminated around peach orchards, and in advance of peach planting.

3579. SHEPARD, C. E., AND BRUER, H. L.
The incidence of phony disease in plum thickets as related to proximity of infected peach orchards.
From abstr. in *Phytopathology*, 1952, **42**: 287.

Surveys of wild plum in Georgia by the chemical test [see abstract 3578] show widespread infection with phony disease. In plum, the disease was found not to be dependent on peach as a source of infection. No appreciable difference in incidence of infection could be demonstrated between plum thickets immediately adjacent to infected peach orchards and those located at varying, relatively small, distances from such orchards. Thickets in an uncultivated area, surrounded by pine woods, had the least average incidence.

3580. KHRISTOV, A.
Plum narrow-striped variegation. [Bulgarian with English and Russian summaries.]
Bull. Un. Travaill. sci. Bulg., 1949, **5**: 15-37, bibl. 6, illus., from abstr. in *Rev. appl. Ent.*, 1952, **40**: 128.

The plum virus disease, narrow-striped variegation, was first observed in Bulgaria in 1935. Narrow pale or yellowish-green lines and rings appear on the leaves in spring, and the fruits, though produced normally, contain more acid and less sugar than usual and sometimes have small sunken rings and spots. In experiments it was transmitted by *Anuraphis padi* and *Brachycaudus helichrysi*, but not by aphids of 4 other species including *Myzus persicae*, or by *Typhlocyba rosae* or *Tetranychus telarius*. The incubation period lasted 8½-13½ months.

3581. CADMAN, C. H., AND HARRIS, R. V.
A lethal virus disease of Lloyd George raspberry in Scotland.
J. hort. Sci., 1952, **27**: 212-14, bibl. 3, illus.

A lethal leaf blotching disease of Lloyd George and Burnetholm Seedling raspberries in Scotland is shown to be graft transmissible. The causal virus produces mosaic symptoms of a hitherto unrecorded type on Norfolk Giant, and non-lethal leaf curling and mosaic diseases on Baumforth's Seedling B, St. Walfried and Malling Promise. The disease resembles, in some respects, the N. American Yellow Blotch-curl and the provisional name Yellow Blotch is proposed. The virus has been transmitted by *Amphorophora rubi* but not by *Doralis idaei*. [Authors' summary.]—Scottish Raspberry Investigation, Dundee.

3582. CADMAN, C. H., AND HARRIS, R. V.
Leaf curl, a virus disease of raspberries in Scotland.
J. hort. Sci., 1952, **27**: 201-11, bibl. 17, illus.

The symptoms of a necrotic, leaf-curling disease of Norfolk Giant raspberry, so far recorded only in Central Scotland, are described. The disease is shown to be graft transmissible. The disease is believed to be aetiologically distinct from the analogous N. American Leaf Curl and Yellow Blotch-curl diseases, and the names raspberry Leaf Curl disease and raspberry Leaf Curl virus are provisionally proposed for the disease and the causal virus respectively. The Leaf Curl virus has been transmitted by grafting to a number of

raspberry varieties and seedlings, and found to cause a necrotic leaf curling disease of Baumforth's Seedling B, a lethal yellow blotch disease of Preussen and the Malling varieties Enterprise, Jewel, and Notable, and a non-lethal chlorosis of Lloyd George, St. Walfried and Malling Promise. Temporary masking of symptoms on Norfolk Giant and Baumforth's B under warm weather conditions has been observed. From records of the development of Leaf Curl outbreaks in Norfolk Giant plantations, it is concluded that the virus spreads more rapidly than others known to infect this variety, though no insect vector has yet been found. [Authors' summary.]—Scottish Raspberry Investigation, Dundee.

3583. CADMAN, C. H.
Studies in *Rubus* virus diseases. II. Three types of vein chlorosis of raspberries.
Ann. appl. Biol., 1952, **39**: 61-8, bibl. 6, illus.

The 3 diseases, which belong to Harris's mosaic type 1 [see *H.A.*, 10: 102], are named mild, moderate and severe vein chlorosis. They give evidence of being caused by related strains of the same virus and are graft transmissible to a wide range of raspberry varieties. *Doralis* (*Aphis*) *idaei* is a vector of moderate vein chlorosis. The mild and moderate types are probably of negligible importance in the field. On Norfolk Giant mild vein chlorosis is inconspicuous and is characterized by faint yellowing of the tissue bordering the smaller leaf veins; in moderate vein chlorosis the symptoms are similar but more generally distributed and much more conspicuous; severe vein chlorosis is characterized by intense chlorosis of the smaller veins and adjacent tissue regularly coalescing into large and conspicuous patches, and by distortion and curling of severely affected leaflets. Roguing should prove an effective means of control.—Scottish Raspberry Investigation.

3584. CADMAN, C. H.
Studies in *Rubus* virus diseases. III. A vein-banding disease of raspberries.
Ann. appl. Biol., 1952, **39**: 69-77, bibl. 14, illus.

The disease, which belongs to Harris's mosaic type 1 [*H.A.*, 10: 102] has been named the chlorotic vein banding disease. It is one of the most common and conspicuous raspberry mosaic diseases in Britain, is transmissible by grafting and by the aphid *Amphorophora rubi*, and induces symptoms on a wide range of varieties. In European varieties the symptoms are conspicuous interveinal chlorosis on main veins and some down-curling of severely chlorotic leaves; they are masked in warm weather foliage. In North American varieties they are analogous to those of North American red raspberry mosaic; they are similar to the symptoms on European varieties but milder, with the chlorosis mainly confined to leaf margins; they are masked in warm weather foliage.—Scottish Raspberry Investigation.

3585. POSNETTE, A. F.
New vectors of strawberry viruses.
Nature, 1952, **169**: 837-8, bibl. 5.

Of the 3 species of aphids tested, *Acyrthosiphon malvae* subsp. *rogersii*, *Myzus ascalonicus* and *Aulacorthum solani*, the two former were found to transmit two components of the strawberry virus complex, though not effectively. Hence, with *Pentatrichopus* (*Capitophorus*) *fragaefolii* and the closely related *P. tetrarhodus* and with the 5 species discussed by Frazier (*see H.A.*, 21:3388) the strawberry viruses of short persistence in the vectors are now known to be transmissible by nine species of aphid. The significance of vectors other than *P. fragaefolii* in the spread of strawberry virus diseases has yet to be determined, but it is suggested that these species may be important as introducers of virus from extraneous sources.—East Malling Research Station.

3586. DICKER, G. H. L.
The biology of the strawberry aphid, *Pentatrichopus fragaefolii* (Cock.), with special reference to the winged form.
J. hort. Sci., 1952, **27**: 151-78, bibl. 32.

The synonymy and host plants of the strawberry aphid, *Pentatrichopus fragaefolii* (Cock.) [vector of all the strawberry virus diseases known to occur in this country] are discussed; the rate of development of the nymph and fecundity of the apterous adult have been studied under insectary conditions. Intensive sampling of selected infested fields throughout the year in Kent and from May to July in Hampshire, Worcestershire and the Isle of Ely during the period 1943-46 have shown that two distinct rhythms exist in the annual cycles of this aphid. On first-year plants the population rises to a peak in late summer or early autumn, then declines, whilst on older plants a peak is reached in late May or June followed by a rapid decline with low populations persisting for the rest of the year. Alatae occur from early May until late June or July and in greatly reduced numbers from October until January or February. The behaviour of the winged forms is discussed and the mode of infestation of clean strawberry beds is described. Evidence is presented to suggest that the rapid decline in populations during June on plants over one year old is primarily due to a reduction in the number and quality of the young leaves produced at that time as a result of fruit development. [Author's summary.]—E. Malling Res. Stat., Kent.

3587. HUGLIN, P.
Die infektiösen Abbaukrankheiten der Rebe. **(Infective degeneration diseases of the vine.)** [English and French summaries 9 lines each.]
Mitt. Klosterneuburg, 1952, **2**: 91-8, bibl. 17, illus.

The virus diseases of vine are surveyed and their importance indicated. Their symptoms are somewhat indefinite and cannot always be considered as giving definite proof of virus attack. The necessity for absolutely sound grafting material and a resting period of 6-10 years for land previously infested with phylloxera is stressed.

3588. BRANAS, J.
Remarques et observations sur la dégénérescence infectieuse de la vigne. **(The infectious degeneration of the grapevine.)**
Progr. agric. vitic., 1952, **137**: 310-24, bibl. 3.

The term infectious degeneration is here used to include various forms of vine diseases which have been described by previous writers as court-noué, mosaic, roncet, etc. The chief symptoms are a laciniation and asymmetry of the leaves and a modification of the

venation. Theories as to its etiology are discussed particularly with reference to the possibility of it being due to virus.

3589. CASTRO, R.
Jaunissement et dégénérescence des vignes dans la région d'Almeria. (Yellowing and degeneration of vines in the Almeria region.)
Bull. Off. int. Vin, 1951, **24**: 244: 88-91.

"Canary yellowing" is contagious, shows first as intense colouring of a branch or branches of which the leaf blades turn yellow, and later spreads to the whole plant. Though its symptoms are not quite typical, the type of degeneration prevalent may well be infectious degeneration. In association with it there are fairly frequent cases of degeneration of the fruit only, which are due to overproduction and can be cured by pruning and manuring.

Bacteria.

(*See also* 3301, 3302, 3713b.)

3590. DUNEGAN, J. C., AND OTHERS.
A rapid method for testing susceptibility of pear seedlings to *Erwinia amylovora*.
From abstr. in *Phytopathology*, 1952, **42**: 341.

Pear seedlings from crosses of known parentage were inoculated when in bloom, and again when the green shoots were 6-8 in. long, with an aqueous suspension of *Erwinia amylovora* and an abrasive (pyrophyllite), using a power sprayer with a single gun. No blight symptoms appeared on control (unsprayed) plants, but nearly half the inoculated seedlings showed infection. In the different groups development of blight appeared to be correlated with the known susceptibility of the parents, crosses with Comice as a parent being particularly susceptible. The method permits of rapid comparisons of reactions of different crosses.

3591. KIRBY, R. S.
Mercury sprays give indication of reducing bacterial leaf spot of peach foliage.
Plant Dis. Reptr, 1952, **36**: 68.

Puratized Agricultural Spray (1 pt. in 100 gal.) was applied to 4 rows of peach trees in a commercial orchard, at (1) pink stage, (2) full bloom, (3) petal fall, and (4) first cover. The second cover and later sprays were wettable sulphur. The adjoining rows were sprayed throughout with wettable sulphur. The results showed that mercury sprays markedly reduced bacterial leaf spot (*Xanthomonas pruni*), and that there was less brown rot blossom blight and fruit rot (*Monilinia fructicola*) in the rows receiving mercury than in those only receiving wettable sulphur.—Pennsylvania State College.

Fungi.

(*See also* 3494, 3713b, h, k, l, p, q, r, u, v, w, y.)

3592. MARSH, R. W.
The spread of *Armillaria mellea* in apple orchards.*
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 116-21, bibl. 2.

* A slightly abridged version of a paper to appear in *Trans. Brit. Mycol. Soc.*

The spread of *Armillaria mellea* in 2 grassed apple orchards in Somerset was recorded annually from 1938 to 1951. The orchards contained standard trees on seedling stocks of various ages up to more than 30 years. The fungus often made slow progress in the tissues, and differences in the rate of root invasion, taken in conjunction with the inaccessibility of most of the roots, may account for the apparent lack of any consistent pattern of spread. The rarity of trunk infection in young trees and its much more frequent occurrence in older trees suggest the hypothesis that the invasion of seedling apple roots is a gradual process in which the balance in favour of the fungus increases as the vigour of the tree declines. These results suggest that the use of trenches or similar barriers to control the spread of the disease may be of doubtful value.

3593. TAYLOR, J.
Some north Georgia apple production problems.
From abstr. in *Phytopathology*, 1952, **42**: 288.

Observations in north Georgia apple orchards during 1951 showed that apple black rot (*Physalospora obtusa*) caused more loss to growers than all other diseases and pests combined. Usually the fruit is affected as it begins to ripen and falls prematurely. About 62% of all drops were affected with black rot. The disease seriously affected the varieties Golden Delicious (73%), Red Delicious (60%) and Stayman Winesap (30%). Leaf symptoms caused by this fungus were more severe in orchards sprayed with bordeaux mixture than in those sprayed with ferbam. The unusually dry growing season in 1951 prevented extensive development of apple scab and bitter rot, but apparently had no effect on black rot.

3594. BYRDE, R. J. W.
The effect of age of wound and of weather on susceptibility of apple injuries to infection by the brown rot fungus.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 128-31, bibl. 3.

Infection of apple fruits by the brown rot fungus, *Sclerotinia fructigena*, took place less readily on day-old injuries than on those freshly made. Susceptibility of Laxton's Superb apples to brown rot infection in early September (mean temperature approx. 61·6° F.) was much higher than in late September (mean temperature approx. 55·7° F.). [Author's summary.]

3595. BYRDE, R. J. W., AND FIELDING, A. H.
Tests of eradicant fungicides against brown rot. I.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 131-3, bibl. 2.

1. In tests on the inhibition of sporulation of detached mummified apples infected with *Sclerotinia fructigena*, the diphenyl mercuric salt of dinaphthyl methane disulphonic acid showed the same order of eradicant efficiency as phenyl mercury chloride. 2. Similarly, no significant difference in eradicant action was demonstrated between pentachlorophenol and its sodium salt. [Authors' summary.]

3596. Byrde, R. J. W.
Experiments on the control of brown rot of apples and plums. II. Winter spraying trials.
J. hort. Sci., 1952, **27**: 192-200, bibl. 9.

In order to determine the possibility of controlling brown rot of apples and pears by winter applications of an eradicant fungicide, tests were carried out on detached mummified plums infected with *Sclerotinia fructigena* and *S. laxa*, detached cankered apple twigs infected with *S. fructigena*, and orchard trees of Laxton's Superb apple and Giant Prune plum. Several fungicides were used in the laboratory trials; phenyl mercury chloride was used in the orchard trials. In the laboratory trials winter applications of several eradicant fungicides largely inhibited the production of sporing pustules. The effective materials fell into 3 broad chemical groups—organo-mercurials, arsenites and substituted phenols and cresols. Many fungicides of value as protectants against infection by air-borne spores showed no eradicant action on mycelium in the plant tissues. With arsenites the inhibition of sporulation was most promising, but their highly poisonous nature prejudices their use commercially. Both sodium dinitro-ortho-cresolate and sodium pentachlorophenate showed promise as eradicant fungicides, but they are reported to be erratic in field performance as a result of high solubility. Pentachlorophenol is considered the most promising of all the eradicant fungicides tested in the laboratory and could be conveniently used in a winter tar oil spray. Although field applications of phenyl mercury chloride at 0·2% or 0·3% in early March resulted in approximately 90% reduction in sporulation of overwintered mummified apples or plums borne on the trees, no significant control of the brown rot infection of the subsequent crops was achieved. This is mainly a result of the prolific and rapid sporulation of the pathogen, resulting in several generations during the summer, and a rapid build-up of the disease from a small inoculum. Moreover, the necessity of obtaining thorough coverage when using phenyl mercury chloride has been demonstrated, and its present high cost is a serious practical disadvantage. Phytotoxicity was a negligible factor in the course of the winter spraying trials.—Long Ashton Res. Stat., Bristol.

3597. Sharvelle, E. G., and Burkholder, C. L.
Evaluation of fungicides for the prevention of peach brown-rot.
Stat. Bull. Purdue Univ. agric. Exp. Stat. **564**, 1951, pp. 19, bibl. 19, illus.

The results of greenhouse work indicated that liquid lime-sulphur, phygon, wettable sulphur, and actidione all gave significant protection against brown-rot blossom-blight. Phenyl-mercury and glyoxalidine compounds were not effective. Other results showed that liquid lime-sulphur, phygon and a combination of ½ lb. phygon and 4 lb. of wettable sulphur could eradicate established infections of blossom blight. Wettable sulphur alone was not an effective eradicant. Field trials indicated that there was no significant difference in the effectiveness of liquid lime-sulphur, wettable sulphur, phygon and a combination of 2 quarts of liquid lime-sulphur and 4 lb. of wettable sulphur, but a single spray of either phygon or liquid lime-sulphur applied 10 days before harvest did not give satisfactory brown-rot control. The evaluation of field fungicide treatments was made by comparing the amount of brown-rot developing on samples of fruit collected at intervals during harvest time and held without refrigeration for 5 days.

3598. Burkholder, C. L., and Sharvelle, E. G.
Several orchard management practices which are an aid in preventing in-transit brown rot of peaches.
Trans. Ill. St. hort. Soc. for 1951, 1952, pp. 219-32.

In addition to the accepted programme of fungicidal spraying, it is stated that control of brown rot can be facilitated by the use of less nitrogenous fertilizer, wider spacing, pruning to avoid dense renewal growth, orchard sanitation, more uniform spray coverage and picking at a less mature stage.

3599. Haller, M. H., and others.
Post-harvest fungicidal treatments of peaches tested in 1951.
From abstr. in *Phytopathology*, 1952, **42**: 341-2.

Various chemicals were tested on peaches, half of them inoculated with *Monilinia* spores, the other half with *Rhizopus* spores. The best results against *Monilinia* infection (reduction of decay at least 75%) were given by sprays of Orthocide 406 (1 and 2%), Dowicide A (0·5%), Isothan Q15 (0·5%), and DHA-S (2%) and sulphur dust (90%). Reduction of *Rhizopus* infections varied, but some preparations showed promise.

3600. Byrde, R. J. W., Crowdy, S. H., and Roach, F. A.
The role of eradicant sprays in the control of apple canker.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 134-7, bibl. 6.

Sodium pentachlorophenate and phenyl mercury chloride have been tested as eradicant sprays against apple canker. Both chemicals checked sporulation of *Nectria galligena* on cankers but phenyl mercury chloride was the more effective and reduced sporing over fifteen months after application. The incidence of leaf-scar infection was diminished by treatments reducing sporulation, such as spraying with phenyl mercury chloride or the removal of diseased material from the tree. Bordeaux mixture used as a protectant winter spray was ineffective in reducing leaf-scar infection. [Authors' summary.]

3601. Viennot-Bourgin, G., and Messiaen, J.-M.
Étude morphologique et biologique du chancre à *Diaporthe* du pommier et du poirier en France. **(The morphology and biology of *Diaporthe* canker on apple and pear trees in France.)**
Ann. Inst. nat. agron., 1951, **38**: 5-50, illus.

The fungal parasite, *Diaporthe perniciosa*, has been present for a few years in some of the dessert apple districts of France, especially Anjou, in the Normandy cider apple areas and in pear orchards near Paris. Its symptoms, morphology and biology are described. It occurs on trees of all ages, gaining entry through

open wounds. Since the canker is only curable in the earliest stages, prevention of infection is important. This may be achieved in the case of small wounds by prompt painting with liquid fungicide and in the case of large ones by prompt sealing with grafting wax, white lead or a mixture of linseed oil and red lead. The burning of dead or pruned branches suspected of being infected is recommended.

3602. TOGLIANI, F.
Contributo alla conoscenza di uno sferossidale del genere *Peyronellaea*. **(A contribution to the knowledge of a sphaeropsidal fungus of the genus *Peyronellaea*.)** [English summary 8 lines]
Ann. Sper. agrar., 1952, **6**: 81-94, bibl. 6, illus.
The morphology and biology are described of *Peyronellaea veronensis*, a sphaeropsidal fungus which is the cause of papery bark canker and leaf spotting in apples and has appeared on many kinds of fruit trees in various parts of Italy in recent years.

3603. CROXALL, H. E., GWYNNE, D. C., AND JENKINS, J. E. E.
The rapid assessment of apple scab on leaves.
Plant Path., 1952, **1**: 39-41, bibl. 3.
A standard diagram showing 5 leaves with different rates of infection varying from 1 to 50% and a simple key are employed. Tests showed that the method may safely be utilized to detect major differences in a spraying trial and to follow the course of the disease through the season, as well as for general survey work. —N.A.A.S.

3604. BYRDE, R. J. W., AND MARSH, R. W.
Spraying experiments against apple and pear scab at Long Ashton, 1951.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 122-8, bibl. 3.
On Worcester Pearmain apples 3 applications of either 0·24% zinc dimethyldithiocarbamate (ziram) or 0·24% tetramethylthiuram disulphide (thiram) gave control of scab equal to 3 applications of lime sulphur. Russeting was noted on 16% and 21% of the fruits sprayed with thiram and ziram respectively. Three proprietary organo-mercury sprays used at 0·002% Hg gave less effective control. In a second trial on Worcesters 0·1% trichloromethylthiotetrahydrophthalimide (SR. 406) gave better control than lime sulphur and was non-phytotoxic to this variety and to Lane's Prince Albert and Stirling Castle. A 34% preparation of heptadecyl glyoxalidine (341. SC), used at 0·375%, equalled lime sulphur in apple scab control but was less effective than the phthalimide spray against pear scab; it showed no phytotoxic effect on Cox's Orange Pippin and Lane's Prince Albert.

3605. WENZL, H.
Die therapeutische Bekämpfung des Apfelschorfes (*Venturia inaequalis*). **(Therapeutic control of apple scab.)** [English summary ¼ p.]
PflSch. Ber. Wien, 1952, **8**: 75-92, bibl. 41.
Concentrated organic mercury sprays (60-120 g. Hg per 100 l.) applied to certain apple varieties in Austria, while showing marked therapeutic action in eradicating young scab infection of the leaves and fruit, proved to be phytotoxic in most cases. A low concentration spray of the order of 2·6 g. Hg per 100 l. was considerably less effective and intermediate rates gave results proportionate to the concentration applied. The low concentration mercury sprays were about as effective as a 1·5% lime sulphur treatment.

3606. YOUNG, H. C.
New fruit fungicides—their adaptability for better timing of sprays.
Wis. Hort., 1952, **42**: 92.
In preliminary trials for 2 years in Ohio such materials as the Puratized group, Tag, manganese ethylene bis dithiocarbamate, and Crag Fruit Fungicide were found quite effective against apple scab when applied after rain. The importance of spraying after a rainy period is emphasized.

3607. BÖMEKE, H.
Die Blütezeit als Spritztermin erhöht den Erfolg und vermindert die Anzahl der Spritzungen. **(Spraying at blossoming time improves success and reduces the number of applications required.)**
Mitt. ObstbVersuchsrings Jork, 1952, **7**: 58-65, illus.
A discussion on apple scab control with special reference to spraying at full bloom with materials harmless to bees such as Fuclasin, Nirit and wettable sulphur.

3608. SHAY, J. R., AND HOUGH, L. F.
Evaluation of apple scab resistance in selections of *Malus*.
Amer. J. Bot., 1952, **39**: 288-97, bibl. 16, illus., being *J. Pap. Purdue Univ. agric. Exp. Stat.* **582**.
Thirty species and varieties of the genus *Malus* have shown high resistance to infection by *Venturia inaequalis* (Cke.) Wint. in field and controlled infection tests. The field tests on several clones were obtained in 10 widely separated locations. Under controlled infection tests all except two clones developed resistant-type symptoms. One resistant-type symptom consisted of pin-point pits which developed as early as 2½ days following inoculation. The pits appear to be caused by the collapse of the leaf epidermal cells underlying the penetration peg. No evidence has been obtained so far to indicate the occurrence of strains of the pathogen that can incite the susceptible reaction on these resistant clones. Variations of the isolates tested on a particular resistant clone appeared to be limited to the range between no symptoms and resistant-type symptoms typical of the clone. A hybridization programme by the authors and others to combine the resistance of these clones with the fruit size and quality of commercial apple varieties is under way. [Authors' summary.]

3609. ADAM, D. B., GRACE, J., AND FLENTJE, N. T.
The " gummosis " or " dieback " disease of apricots.
Tasm. J. Agric., 1952, **23**: 128-35, bibl. 2, illus.
A disease of apricots in South Australian and Tas-

manian orchards causing gummosis and dieback is attributed to *Cytosporina* sp. The most obvious symptom is the progressive dying back of infected branches, sometimes accompanied by gumming, cracking or cankers; if left untreated, a diseased tree may lose branches year by year so that within 4 or 5 years from its initial infection it may become valueless. Control measures are (1) regular, thorough inspection of trees, followed by early and complete removal of infected portions, (2) painting all large cuts, (3) disinfection of pruning tools, and (4) destruction of all apricot prunings, whether from diseased or healthy trees.

3610. Felix, E. L.
Rhizoctonia blight of strawberry
From abstr. in *Phytopathology*, 1952, **42**: 283.
Severe blight, caused by *Rhizoctonia solani*, killed strawberry plants in localized spots in experimental plots at Knoxville, Tennessee, during the past 3 years. The disease first appeared on the leaflets as large brown areas, which soon involved the entire leaf blades, petioles, and finally the whole plant. It was observed only occasionally on certain crosses, and has not yet been seen on commercial varieties of strawberry.

3611. Sprague, R., and Hord, H. H. V.
The reappearance of silver leaf in the apple orchards of Washington State.
Plant Dis. Reptr, 1952, **36**: 30, bibl. 1.
Symptoms of silver leaf, *Stereum purpureum*, were observed in 1950 in parts of north central Washington for the first time in a number of years, and its return in all commercial varieties following the two severe winters 1949 and 1950 caused concern. Old trees should be removed. Young trees, if given normal care, will continue to be useful, although their life expectancy is somewhat lessened. Adequate fertilizer with moderate irrigation is needed. In replanting orchards, hardy rootstocks such as Hibernal should be used. Double-worked frameworks of Hibernal, Charlamoff or Antonovka may also prove useful in developing hardy stems resistant to winter injury and silver leaf.—State College of Washington, Pullman.

3612. Goidanich, G., Branzanti, E. C., and Togliani, F.
Osservazioni sul mal del piombo del pesco in Emilia ed in Romagna. **(Research on silver leaf disease of peaches in Emilia and Romagna.)**
Riv. Fruttic., 1952, **14**: 7-19, illus.
The symptoms of the type of silver leaf disease of peaches endemic in the Emilia-Romagna area are described. In the authors' view the cause has not been conclusively determined and may be either a basidiomycete, probably of the *Stereum* type, or a virus. The results of experiments in the artificial reproduction of the disease by inoculation with *Stereum* isolated from infected plants are described. Experimental grafting of healthy scions on infected stock and *vice versa* also took place, and after seven months there had been no transmission of infection. On these results the authors incline to the theory of parasitic origin.

3613. Ghillini, C. A., and Mezzini, L.
Di un caso di " mal del piombo " del pesco. **(A case of silver leaf disease of peach.)** [English and French summaries 5 and 6 lines.]
Riv. Fruttic., 1952, **14**: 65-73, bibl. 3, illus.
A single peach tree was found showing silver leaf symptoms on part of its foliage, and vascular continuity was found to exist between the affected branch and a section of the root system that was rotting. *Melanospora stysanophora* was found in both places and its parasitism is suspected. This will be investigated.

3614. Lehoczky, J.
Az alma koromfoltossága. **(Sooty blotch on apples.)** [English and Russian summaries 1 p. each.]
Agrártud. egy.,* 1950, **1**: 95-100, bibl. 7, illus. [received 1952].
Sooty blotch, caused by *Gloeodes pomigena*, is primarily an apple disease but it also attacks pears. Of the varieties examined Batul and Cox's Orange Pippin were found to be most susceptible. *Leptothyrium pomi* often appears on fruit infected by sooty blotch. Bordeaux sprays applied against apple scab, *Venturia inaequalis*, also control sooty blotch and for the protection of stored fruit copper preparations are also recommended. Mechanical or chemical removal of blotches from the skin of already infected fruit was found effective and produced marketable fruit.

3615. Demaree, J. B., and Smith, N. R.
***Nocardia vaccinii* n.sp. causing galls on blueberry plants.**
Phytopathology, 1952, **42**: 249-52, bibl. 7, illus.
Bud-proliferating galls ½ to 2 in. in diameter forming a witches' broom effect have been found on young blueberry plants in Maryland. The galls occurred naturally on plants at, or immediately below, ground level and rarely on roots. The fungus causing the galls is described under the name *Nocardia vaccinii*.

3616. Fulton, R. H., and Grigsby, B. H.
The effect of several soil treatments on mummy berry disease of blueberries in Michigan.
Quart. Bull. Mich. agric. Exp. Stat. 1952, **34**: 297-302, bibl. 9.
An oil-treated, calcium cyanamide dust, the sodium salt of dinitro ortho cresol and the alkanolamine salt of dinitro-o-sec-butylphenol sprays were effective in reducing the incidence of mummy berry disease of blueberries caused by *Monilinia vaccinii-corymbosi*.

3617. Govi, G.
La cercosporiosi o " piombatura " dell' olivo. **(Cercosporiosis of the olive.)** [English summary 6 lines.]
Ann. Sper. agrar., 1952, **6**: 69-80, bibl. 14, illus.
The morphology and biology of *Cercospora cladosporioides* and the identification of the disease are briefly described.

* Formerly *Bull. Fac. Hort. Buda.*

3618. BRICHET, J.
" L'oeil du paon " (*Cycloconium*), maladie grave du feuillage de l'olivier. **(Olive leaf spot, a serious disease of olive leaves.)**
Fruits et Prim., 1952, **22**: 10-11.

A disease of olive trees, for long confined to the wild olives in certain humid areas, is now becoming serious among cultivated olives in North Africa. The old leaves of affected trees become covered towards the end of winter with numerous dark brown, concentric, circular spots and the leaf blades turn yellow so that the spots resemble somewhat the multi-coloured eyes on peacock feathers. The diseased leaves drop, the denuded branches dry up, tree vigour declines and the crop is small. The disease is caused by the fungus *Cycloconium oleaginum*, and is particularly prevalent in moist, mild autumns with temperatures of 15-20° C. Varietal differences in susceptibility are discussed. Control measures, based on Californian experiments, are discussed; the best appears to be the use of bordeaux mixture 10:10:100 applied in early autumn.

3619. CASTELLANI, E.
Osservazioni e ricerche sull' " occhio di pavone " dell'olivo in Sardegna. 1°. La caduta anticipata delle foglie. **(Observations and work on olive leaf spot (*Cycloconium oleaginum*) in Sardinia. Premature leaf fall.)**
Olearia, 1952, **6**: 154-61, bibl. 21.

The author's studies show how the leaf spot fungus damages the olive, resulting in: early leaf fall with consequent decrease in assimilatory surface and a further effect of leaf rather than fruit bud development; increased transpiration, greater consumption of organic matter and reduced photosynthesis in damaged leaves; a slowing down of the flow of elaborated substances from leaves to branches.

3620. GAGNOTTO, A. V.
Considerazioni sulla presenza di un micelio fumaginoide nell' interno dei peli delle foglie di olivo. **(A sooty mould in the hairs of olive leaves.)** [English summary 3 lines.]
Boll. Staz. Pat. veg. Roma, 1950 (issued 1952), **8**: 207-12, bibl. 10, illus.

A fungus with brown mycelium is described as found in the hairs of olive leaves. It is identified as a *Hormiscium*, probably *H. oleae*, and it is the indirect cause of a slight local chlorosis.

3621. HOCKEY, J. F.
Grey mould wilt of raspberry.
Sci. Agric., 1952, **32**: 150-2, bibl. 3, illus., being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric., Ottawa*, **1116**.

The grey mould wilt of raspberries in Nova Scotia has been found to be caused by a strain of the fungus *Botrytis cinerea*. The disease is most prevalent during wet seasons. The sawdust mulch method of culture appears to favour the disease. The pathogen overwinters as subepidermal sclerotia in the canes. The eradication and destruction by burning of affected canes during the late summer and early autumn appears essential to the control of the disease. [Author's summary.]

3622. WILHELM, A. F.
Methoden zur Prüfung von Pflanzenschutz- und Vorratsschutzmitteln. XLVII. Methoden zur Prüfung von Mitteln gegen die Traubenfäule (*Botrytis cinerea*). **(Methods of testing preparations for the protection of plants and stored products. XLVII. Methods of testing preparations for the control of vine grey mould.)**
NachrBl. dtsch.PflSchDienst., Braunschweig, 1952, **4**: 67-71.

The difficulties encountered in the control of grey mould on grapes are discussed with reference to: (1) Present-day considerations of botrytis control (with data tabulated for results obtained with various proprietary products). (2) Tests for botrytis control in the laboratory (on artificially prepared culture media and on vine leaves). (3) Trials of botrytis control preparations in the vineyard (estimation of results).—Staatl. Weinbauinstitut Freiburg i. Br.

3623. MAZZEI, I.
Control de la antracnosis de la vid. **(Control of vine anthracnose.)** [English summary ¾ p.]
Rev. Asoc. Ing. agron. Montevideo, 1950, **22**: 91: 20-9, [received 1952].

Grape anthracnose (*Gloeosporium ampelophagum*) has been increasing to a serious extent in Uruguay in recent years, and in 1947 and 1948 the following experiments were carried out to determine the best method of control. Black and red Muscatel grapes in badly infected vineyards were sprayed in winter with Skawinsky's formula (25 kg. iron sulphate, 2 kg. sulphuric acid, 100 l. water), sodium arsenite at 3%, or sulphuric acid at 6% by volume. Spraying was done after pruning and in some cases the old bark was scraped off before treatment. These sprays were in some cases followed a month later (just before bud break) by a 15% lime sulphur or bordeaux mixture (3% copper sulphate, ¼% hydrated lime) spray. The results showed that all spray treatments were successful provided the old bark was cleaned off before spraying. No damage was done to the vines. It is not considered necessary to scrape the vines more often than once every 2 or 3 years, but in areas where the disease is serious winter spraying should be carried out every year. The one post-pruning spray is considered sufficient.

3624. BALDACCI, E.
Il calendario d'incubazione della peronospora della vite e le sue possibili applicazioni. **(Recording the incubation period of the vine downy mildew and its possible application.)**
Reprinted from *Ann. Accad. Agric. Torino* 1948-1949, **90**, No. 2, as *Pubbl. Ist. Pat. veg. Milano* **1**, pp. 8, bibl. 5.

To make use of records of the incubation periods of the downy mildew of the vine [*Plasmopara viticola*] the rules to be followed are: A. for the first treatment: (1) observe the minimum temperature of the air and note when it is steady about 10° C., (2) register the rainy days after that temperature has been reached, (3) record the number of rainy days up to the time of the appearance of the mildew, (4) carry out the treatment from 5 to 3 days before the mildew is likely to

appear; B. for succeeding treatments: (1) record carefully the rainy days during which the vines remain wet for at least an hour, (2) record the number of rainy days until the mildew appears, (3) carry out the treatment from 3 days to 1 day before the mildew is expected to appear.

3625. MAGNANI, G., CICCARONE, A., AND SIBILIA, C.
Seconda relazione su prove di lotta antiperonosporica con prodotti organici. **(Second report on trials with organic fungicides against vine mildew.)** [English summary 7 lines.]
Boll. Staz. Pat. veg. Roma, 1950 (issued 1952), **8**: 245-8, bibl. 1.

For their first report see *H.A.*, 22: 2369. In 1951 Zineb was used in spray schedules in which the last one or two treatments were with 1% bordeaux mixture. The data relating to degree of infection, to crop, and to the formation of new wood were encouraging, but the early leaf fall, mentioned in the earlier report, was not completely prevented.

3626. BERNON, G.
Progrès de la lutte contre le mildiou de la vigne en France. **(Progress on the control of vine mildew in France.)**
Bull. Off. int. Vin, 1951, **24**: 244: 91-5.

Observation posts were established in 1950 from Bas-Rhône to Pyrénées-Orientales to ensure early reporting and prompt treatment of cases of infection.

3627. LAFON, M.
Le traitement du mildiou de la vigne sans cuivre. **(Non-copper treatment of vine mildew.)**
Progr. agric. vitic., 1952, **137**: 285-7, and *C.R. Acad. Agric. Fr.*, 1952, **38**: 148-50.

Experiments by the Cognac Vinegrowing Centre showed the fungicide TP13 (trichloromethyl-thiotetra-hydrophthalimide) to be much more efficacious than bordeaux mixture against mildew on vines. In 1950 yields from plots treated with 0·5% TP 13, with 2% bordeaux mixture and from untreated controls were 4·87, 3·83 and 1·57 kg. per vine respectively. In 1951 yields with 2–2·5% TP 13 (the dosage above which leaf burn occurs), 2% bordeaux and untreated controls were 4·09, 2·15 and 0·75 kg. per vine. The duration of efficacy of TP 13 is believed to be slightly less than that of bordeaux.

3628. ZUBOV, M. F.
The use of organic sulphur preparations for the control of white rot on grapes. [Russian.]
Vinodelie i Vinogradarstvo, 1952, No. 5, p. 40.

In trials in Russia the organic sulphur preparation No. 2 (15% tetramethyl thiuramdisulphide) applied at 1% concentration gave complete control of white rot of grapes [*Coniothyrium diplodiella*]. Preparation No. 7 (15% ferric dimethyl dithiocarbamate] applied at the same concentration reduced infection by half, while bordeaux mixture was ineffective. Against mildew, neither of the sulphur preparations was satisfactory.

3629. RIEUF, P.
La rouille du pistachier au Maroc. **(Pistachio mildew in Morocco.)**
Fruits d'Outre Mer, 1952, **7**: 70-1, illus.

Selected seed of *Pistacia vera* was introduced into Morocco from the U.S.A. in the spring of 1951. In September of the same year the resultant seedlings developed a leaf mildew, due to *Pileolaria terebinthi*, which caused almost complete defoliation. Only 2 plants, both with the primitive characters of narrow, pointed leaflets, remained unaffected.

3630. FELIX, E. L.
Crown rot of strawberry.
From abstr. in *Phytopathology*, 1952, **42**: 283.

A strawberry crown and root rot, apparently caused by an unidentified fungus, has been observed in Tennessee during the past 5 years. The symptoms are a colourless or brownish rot of roots and subterranean stems, and the lower portion of the stems may be girdled or completely rotten and mealy. Suckers invariably become infected from diseased plants, but the runners do not. Certain morphological and cultural characters of the fungus are described.

3631. ROSA, M.
Una moria dei noccioli del Viterbese. **(Dieback of hazel in the Viterbo district.)** [English summary 4 lines.]
Boll. Staz. Pat. veg. Roma, 1950 (issued 1952), **8**: 249-54, illus.

In autumn hazel bushes showed a withering of 70-80 cm. of the tips, and later branches and limbs died. A fungus consistently isolated from the infected wood is described but not yet identified. The disease is under investigation.

Nematodes.

(*See also* 3713c, i, 3768, 3921-3924, 4002, 4003, 4017m, 4129, 4142, 4149, 4165, 4200m, 4317.)

3632. BROWN, E. B.
Plant parasitic eelworms.
N.A.A.S. Quart. Rev., 1951, **13**: 12-18.

Short notes are given on eelworms and host plants of the following species found in the eastern counties of England: cyst-forming eelworms (*Heterodera* spp.), stem and bulb eelworms (*Ditylenchus* spp.), the leaf eelworm (*Aphelenchoides* sp.), and the root lesion eelworm (*Pratylenchus pratensis*).

3633. ALLEN, M. W., AND RASKI, D. J.
Nematodes on strawberries.
Calif. Agric., 1952, **6**: 6: 3, 14, illus.

In a former apple orchard near Watsonville, California, where strawberries had suffered an infestation of verticillium wilt as well as nematodes, *Pratylenchus* spp., and fungi associated with the disease complex known as root rot or black root rot, preplanting soil fumigation markedly reduced nematode infestation and improved the growth of plants. The most effective treatments were CBP-55 (technical chlorobromopropene 55%) in 2 applications of 15 gal. per acre

5 days apart and single applications of 40 and 80 gal. D-D.

3634. Christie, J. R., Brooks, A. N., and Perry, V. G.
The sting nematode, *Belonolaimus gracilis*, a parasite of major importance on strawberries, celery, and sweet corn in Florida.
Phytopathology, 1952, **42**: 173-6, bibl. 4, illus.

The sting nematode, *Belonolaimus gracilis* Steiner, injures several different crops in Florida, and, in places, has become an important pest on strawberry, celery, and sweet corn. Its effects tend to appear in more or less definite areas, where the plants fail to grow normally and are often severely stunted. Celery may stand throughout the entire growing season and not grow much larger than when transplanted, although very few plants are killed. Corn will tassel out when less than a foot high. The effect on strawberries is to cause both stunting and decline; the leaf edges turn brown, then gradually the whole leaf; since the outer, older leaves die first the plant gradually becomes smaller and eventually may be killed. Abnormalities and necroses appear on the roots. The nematode can be controlled by fumigation. In-the-row application of soil fumigants has given satisfactory control on strawberries, and " solid " applications on both celery and sweet corn.—Florida Agricultural Experiment Station.

3635. Chitwood, B. G., Specht, A. W., and Havis, L.
Root-knot nematodes. III. Effects of *Meloidogyne incognita* and *M. javanica* on some peach rootstocks.
Plant and Soil, 1952, **4**: 77-95, bibl. 32.

Various nematodes associated with decline and chlorosis of peach trees are discussed, and it is stated that moderate quantities of *Meloidogyne incognita* and *M. javanica* sometimes cause significant increases in peach growth. Of the peach seedling rootstocks Lovell, Yunnan, Red Shadow, Davidson, S 37, and P.1.146135 × *Prunus davidiana* investigated as to their response to these two root-knot nematodes, the variety S 37 was found relatively resistant. Other root-knot nematode species may or may not be capable of propagation on this variety. Root-knot nematodes can cause significant damage to peach tree growth even when they are unable to propagate themselves on the roots of the variety. Breeding of resistant varieties, therefore, in no way lessens the importance of using resistant cover crops, and preplanting soil fumigation is likewise valuable, even though the use of a resistant variety is planned. In this investigation stimulation of growth of peaches by nematodes was associated with greater accumulation of Mg and Ca in the leaves than when injury occurred. In contrast to this tendency it is important to note that, in the most resistant variety, S 37, the accumulation of Cu and Fe was consistently reduced by inoculation with both nematodes. Of all elements determined in the leaves only K usually showed an increase regardless of specific nematode treatment or seedling variety. [From authors' summary.]

Mites.

(*See also* 3713x.)

3636. Batchelor, G. S.
The eriophyid mites of the State of Washington.
Tech. Bull. Wash. St. agric. Exp. Stats **6**, 1952, pp. 32, bibl. 88, illus.

Host plants of species of eriophyid mites, also known as gall, blister, rust or bud mites, include *Chrysanthemum* sp., *Corylus* spp., *Ilex aquifolium*, *Juglans* spp., *Malus* spp., *Pyrus communis*, *Rhododendron* spp., *Ribes* sp., *Rubus* spp., *Syringa persica*, *Vaccinium membranacium* and *Vitis vinifera*.

3637. Hahmann, K., and Müller, H. W. K.
Zum Auftreten und zur Bekämpfung der Erdbeermilbe.—2. Beitrag. **(The appearance and control of the strawberry tarsonemid mite. Part 2.)**
NachrBl. dtsch. PflSch Dienst., Braunschweig, 1952, **4**: 33-7, bibl. 6, illus.

The appearance and control of the strawberry mite, *Tarsonemus pallidus*, are described under (1) Distribution, (2) spring control, (3) control after the crop is picked, and (4) dipping control method for the young plants. Control in April, at the time of oviposition, was effected by applying gamma-hexa-emulsions and Systox, while E605, owing to the low spring temperatures, was ineffective. After the crop is gathered, in midsummer, the E-preparations (Pox and E605) were rather more effective than the gamma emulsions. Dipping the young plants did not ensure complete elimination of the mites, but when carefully carried out it gave better results than repeated sprayings, the gamma emulsions being much superior to the E-preparations, Systox, and wettable sulphur. To avoid scorching the dipping should last for only a second and the plants should be planted out at once.—Staatsinstitut für Angewandte Botanik, Hamburg.

3638. Miller, L. W.
The hatching of the overwintering eggs of the European red mite.
Tasm. J. Agric., 1952, **23**: 102-16, bibl. 15, illus.

The duration of hatching of the eggs of the European red mite, *Paratetranychus pilosus*, tends to be longer in Tasmania than in England, Europe, and the U.S.A., possibly on account of the milder winters. There was some evidence that the hatching periods and the percentages of viable eggs were less on early than on late varieties. The influence of the type of hatching curve on the efficiency of acaricidal sprays (e.g. lime sulphur) applied at particular stages of tree development is discussed.

3639. Gualaccini, F.
Alterazioni istologiche prodotte dall' *Eriophyes pistaciae* Nal. su *Pistacia terebinthus* L. e presenza di *Uromyces terebinthi* (D.C.) Winter sulla stessa pianta. **(Histological disorders caused by *Eriophyes pistaciae* on *Pistacia terebinthus* and the presence of *Uromyces terebinthi* on the same plant.)** [English summary 10 lines.]
Boll. Staz. Pat. veg. Roma, 1950 (issued 1952), **8**: 221-33, bibl. 19, illus.

Witches' brooms on *Pistacia terebinthus*, found near Subiaco (Lazio), are caused by a mite, *Eriophyes pistaciae*. Swellings at the lower ends of affected twigs are anatomically compared with the structure of normal twigs. As *Uromyces terebinthi* has been occasionally found on the abnormal twigs it is also briefly described.

3640. Michelbacher, A. E., and Bacon, O. G.
Spider mites on walnuts.
Calif. Agric., 1952, **6**: 6: 4, 15.
The development is discussed of a spray programme against aphids and codling moth which will not result in marked increases in populations of Pacific and European red mites.

3641. Asquith, D., and Kane, N. F.
Mite control with concentrated acaricides.
J. econ. Ent., 1952, **45**: 60-5, being *Pap. J. Ser. Pa agric. Exp. Stat.* **1701**.
In a trial of a number of proprietary acaricides in Pennsylvania, TM-300 (EPN 300, ethyl p-nitrophenyl thionobenzenephosphonate) at the rate of 1·5 lb. per 100 gal. in four sprays gave the best control of mites throughout the season on Stayman Winesap apples, although residual effect was better with TM 88R (β-chloroethyl β-(p-tertiarybutylphenoxy)-αmethyl ethyl sulphite) at 6 lb. per 100 gal. applied as fourth or fifth cover spray. Split treatment of parathion and TM 88R reduced the amount of russeting. Green and rosy apple aphids were effectively controlled by either oil and DN paste in the dormant stage, or BHC in the pre-pink stage.

3642. Clancy, D. W., and Pollard, H. N.
The effect of DDT on mite and predator populations in apple orchards.
J. econ. Ent., 1952, **45**: 108-14, bibl. 15.
DDT spray for codling moth control caused a definite increase in late summer populations of the spider mites *Tetranychus bimaculatus* and *T. schoenei* in commercial orchards in Virginia. *Stethorus punctum*, the most important predator in these orchards, was unable to attain controlling numbers until its prey became abundant enough to cause definite injury, regardless of the sprays used. In untreated orchards *Iphidulus* sp. kept mite populations at a very low level, but where DDT was applied to some of the apple trees the predators were killed and infestations increased rapidly.

3643. Lochner, E. H. W.
The control of the red spider (*Tetranychus bimaculatus* Harvey).
Sci. Bull. Dep. Agric. S. Afr. **306** (*Ent. Ser.* **33**), 1951, pp. 29, bibl. 2, illus., 3d.
A description of the mite and its life history is followed by an account of laboratory and greenhouse trials in its control with several of the new insecticides. Of the various dusts applied, 2% parathion and 1% dicyclohexylamine salt of dinitro-ortho-cyclo-hexylphenol gave the best results, especially as ovicides and at high temperatures. Among the sprays, parathion wettable powder and tetra-ethyl pyrophosphate were most toxic to mites. The results indicated that insecticides in emulsion form may prove more effective as ovicides than dusts or wettable powders. All the insecticides tested were more effective against both mites and eggs at high temperatures, but atmospheric humidity did not noticeably affect their toxicity. The toxicity of the insecticides to certain plants was noted.

3644. Lienk, S. E., Chapman, P. J., and Myburgh, A.
Evaluation of acaricides against three species of orchard mites.
J. econ. Ent., 1952, **45**: 292-7, bibl. 3, being *J. Pap. N.Y. St. agric. Exp. Stat.* **885**.
In trials at Geneva, New York, against the overwintering eggs and first brood of European red mite, *Paratetranychus pilosus*, trialkyl thiophosphate gave excellent results in single sprays, applied either in the delayed dormant, pink or calyx stages. Very good control was obtained against the European red mite and two-spotted spider mite, *Tetranychus bimaculatus*, with parathion, ethyl-p-nitrophenyl thionobenzenephosphate, tri-alkyl thiophosphate, p-chlorophenyl p-chlorobenzene sulphonate, 2,4-dichlorophenyl benzene sulphonate, S-(1,2-dicarbethoxyethyl)-0,0-dimethyl dithiophosphate, and in the case of the two-spotted mite with 4,4-dichlorobenzilicacidethyl ester. Against the clover mite, *Bryobia praetiosa*, ethyl-p-nitrophenyl thionobenzene-phosphonate proved inferior to parathion. [From authors' summary.]

3645. Taylor, G. G.
Spray treatments for control of red mites in apple orchards.
N.Z. J. Sci. Tech. Sect. A, 1952, **34**: 36-46, bibl. 2.
Two species of mites, *Paratetranychus pilosus* (the European mite) and *Bryobia praetiosa* (clover mite) are liable to cause severe foliage injury in most apple orchards in New Zealand. In field trials for their control Selocide (a preparation containing selenium in 48% solution) was the most effective material tested; its ovicidal properties were moderate but residual toxicity gave control for several months, and two applications during or shortly after the blossom period gave control of mites for most of the growing season. It showed synergic effect in combination with sulphur, but when combined with lead arsenate there was severe foliage injury. HETP was highly effective against adults and nymphs, but was a poor ovicide. Parathion, arathane and BHC all controlled mites at the time of spraying but residual toxicity was low. Dynone gave only partial control and DN III caused foliage injury. Summer oil was effective against adult and nymph stages of mites but reinfestation occurred.—D.S.I.R., Auckland.

Insects.

(*See also* 3516-3519, 3586, 3713d, e, f, j, l, o, s, w.)

3646. Hill, A. R.
A survey of insects associated with cultivated raspberries in the east of Scotland.
Ent. mon. Mag., 1952, **88**: 51-62, bibl. 31.
Of the 137 species of insects recorded on cultivated raspberries only the following 4 can be regarded as major pests: *Byturus tomentosus*, *Incurvaria rubiella*, *Otiorrhynchus singularis* and *Lygus pabulinus*. Other insects of importance are the two virus vector aphids *Amphorophora rubi* and *Doralis idaei*. *Cnephasia*

virgaureana and *Ametastegia glabrata* would appear to be potential pests.

3647. MANARESI, A.
Possono le api danneggiare i fichi? **(Can bees damage figs?)**
Riv. Fruttic., 1952, **14**: 1-6, bibl. 10, illus.
Bees damaged the figs of two early-ripening varieties more or less seriously in 3 ways: (1) by insertion of the proboscis through the cracks that normally develop in the skin shortly before maturity, (2) by the insertion of the proboscis through the intact skin and (3) by the entry of the insect into the interior of the fruit through the ostiole.

3648. MICHELBACHER, A. E., BACON, O. G., AND WADE, W.
Walnut aphid investigations.
Calif. Agric., 1952, **6**: 4: 6, 12.
Trials are described which suggest that walnut aphids can be controlled satisfactorily and economically by adding an aphicide to the codling moth spray in late April or May. Of the materials so far tested parathion gave the best control. BHC, TEPP and EPN 300 were also effective, but nicotine was only satisfactory under favourable conditions.

3649. CHRESTIAN; P.
Le problème du capnode au Maroc (*Capnodis tenebrionis* L.). **(The capnodis problem in Morocco.)**
Fruits d'Outre Mer, 1952, **7**: 2-8, bibl. 7, illus.
The morphology and biology of the wood-boring beetle, *Capnodis tenebrionis*, is given. The pest is present in all milder Moroccan fruit-growing districts and is spreading despite intensive control measures.

3650. BRAUNS, A.
Zur Frage der Bockkäferschäden in Obstbäumen. **(Capricorn beetles damaging fruit trees.)**
NachBl. dtsch. PflSchDienst., Braunschweig, 1952, **4**: 66-7, bibl. 9.
An account is given of infestations of fruit trees by capricorn beetles, which usually occur on forest trees. *Cerambyx scopolii* has been found causing damage to apple, cherry, plum and walnut, and *C. cerdo* to apple, pear and cherry.

3651. AERTS, P. F., AND BOUGARD, M.
Chemical control of white grubs or cockchafer larvae.
Plant Prot. Overs. Rev., 1951, **2**: 3: 5-11, illus.
Notes on the control of cockchafer larvae with BHC as a dust in uncultivated and as a liquid in cultivated areas.

3652. FABER, W., AND SCHREIER, O.
Maikäfer-Bekämpfungsversuche 1951 in Österreich. **(Cockchafer control trials in Austria in 1951.)** [English summary ½ p.]
PflSch. Ber. Wien, 1952, **8**: 97-117, bibl. 13.
Good control of cockchafers in forest borders and avenues was obtained with DDT, BHC and E605, sprays being more persistent and effective than dusts. White grub infestation in the treated area was about 50% lower than in untreated areas.

3653. WHITCOMB, W. D.
A cooperative test to evaluate methoxychlor for control of plum curculio on apples.
J. econ. Ent., 1952, **45**: 68-72.
Trials in 6 states have shown that 3 lb. of 50% methoxychlor wettable powder in 100 gal., and 2 lb. of 50% methoxychlor wettable plus 2 lb. of lead arsenate in 100 gal. give 97% control of plum curculio in heavily infested apple orchards. Under similar conditions, 3 or 4 lb. of lead arsenate in 100 gal. gave 93% control.

3654. CHANDLER, S.
Studies of plum curculio on apple in 1951.
Trans. Ill. St. hort. Soc. for 1951, 1952, pp. 285-99.
The life history of plum curculio is outlined. Of 4 apple varieties studied in one test, the order of curculio susceptibility was Transparent, Delicious, Jonathan and Winesap. While the outstanding preparation for curculio control was dieldrin at ¼ lb. per 100 gal., the best general purpose insecticides were parathion and EPN.

3655. SNAPP, O. I.
Plum curculio control on peach in 1951.
J. econ. Ent., 1952, **45**: 249-51, bibl. 4.
Dieldrin gave the best control of plum curculio on peaches in a trial in Georgia, followed by parathion. Neither of the insecticides affected the flavour of fresh peaches nor did they injure the trees.

3656. REICH, H.
Der ungleiche Holzbohrer. **(The shot hole borer.)**
Mitt. ObstbVersuchsrings Jork, 1952, **7**: 87-9, illus.
Shot hole borer, *Anisandrus dispar*, in the Altenland mainly damages plums, cherries and apples. Of the control measures tried, spring applications of hexa-preparations at double or treble normal strength were found most satisfactory.

3657. SCHVESTER, D.
Premiers essais, en laboratoire, de formules insecticides contre le xylebore disparate: *Xyleborus dispar* F. (Col. Scolytidae). **(Preliminary trials, in the laboratory, of insecticide formulae against the shot hole borer, *Xyleborus dispar* F.)**
Ann. Épiphyt., 1952, **3**: 1-9, bibl. 1.
The results of the tests show that (1) HCH and DDT have an immediate effect on the shot hole borer beetle, (2) the effect of DDT is more persistent than that of HCH, (3) the addition of emulsified petroleum oils seems to increase the persistence of DDT, but to reduce that of HCH.—Laboratory of the San José Scale, Saint-Genis-Laval.

3658. KUENEN, D. J., AND LEMS, H. G.
De invloed van het voedsel op de eiproductie van de perebloesemkever, *Anthonomus cinctus* Koll. **(The influence of food on the egg production of the pear blossom weevil, *Anthonomus cinctus* Koll.)** [English summary 9 lines.]
Tijdschr. PlZiekt., 1952, **58**: 80-4, bibl. 1.
The preferences (apparent or real) of insects for certain

varieties of crops depend on several factors. In tests with the pear blossom weevil, which in autumn feeds on and oviposits in pear fruit buds, the amount of food eaten by the weevils was about the same on three different varieties, but the number of eggs produced depended on the variety. The weevils oviposited most freely on Doyenné du Comice, less so on Louise Bonne d'Avranches and least on Triomphe de Vienne. It is believed that the difference in egg production on the three varieties is the reason for their apparently different " susceptibility " to attack by the weevil.—Leiden University.

3659. MORGAN, G. T., AND MAXWELL, C. W.
Chlamisus sp. (Coleoptera: Chrysomelidae), a new pest of strawberries.
Canad. Ent., 1952, **84**: 123-4, bibl. 5.

Larvae of a *Chlamisus* species were found from about the middle of June to the end of July feeding voraciously on strawberries in New Brunswick. Although attacking all aerial parts of the plant, they showed a strong preference for the leaves.

3660. MYBURGH, A. C.
Olive beetle in the Western Cape Province.
Fmg S. Afr., 1952, **27**: 247-9, 253, bibl. 4, illus.

Descriptions are given of 3 chrysomelid beetles, *Argopistes oleae*, *A. sexvittatus* and a small green beetle (referred to as Ac.F.R.181), and of their life histories, and the damage, often serious, that they cause to olive leaves and fruits in the Western Cape Province is noted. Experiments on control were started in 1942 and are still in progress. To date the most effective spray material has been 50% DDT wettable powder used at the rate of 2 lb. per 100 gal. and applied early in September when the adults first become active, or, when this has been missed, in mid-November when the first-brood adults emerge.

3661. BORDEN, A. D., MADSEN, H. F., AND RETAN, A. H.
A stink bug _Euschistus conspersus_, destructive to deciduous fruits in California.
J. econ. Ent., 1952, **45**: 254-7, bibl. 6, illus.

Stink bugs have caused heavy damage to apples, apricots, peaches, figs, and particularly to Bartlett pears in California during the past 2 years. In trials conducted in 1951 lindane, parathion and dieldrin gave very good control of the pest, provided clean cultivation was practised in the orchards and broad leaved host plants (weeds) growing in adjoining areas were destroyed.

3662. DÜRR, H. J. R.
An apparently new insect pest of fruit.
Fmg S. Afr., 1952, **27**: 293-4, illus.

The stink bug *Serinetha hexophthalma*, which has been found attacking pome and stone fruits, vines, oranges and several other plants in the Cape Province, is described with notes on its life history. DDT as a contact spray and parathion have given good control. Good results were also obtained in one case by washing the insects off the trees with a water spray applied at high pressure followed by spraying the ground with a strong solution of parathion.

3663. MUNDINGER, F. G., AND SLATE, G. L.
Insecticide sprays as a probable control of " sterility " in blackberries.
J. econ. Ent., 1952, **45**: 135-6.

In preliminary trials at the N.Y. State Agricultural Experiment Station both DDT and dieldrin markedly reduced the incidence of " sterility " in blackberries, the cause of which is thought to be attack by the tarnished plant bug.

3664. CHABOUSSOU, F., AND RAMADIER, P.
Essais d'appâts empoisonnés contre les courtilières. **(Trials with poison baits for control of mole crickets.)**
Rev. hort. Paris, 1952, **124**: 676-8, bibl. 4, illus.

Barium fluosilicate, hexachlorocyclohexane, parathion, chlordane, aldrin and dieldrin were compared with the traditional phosphide of zinc for use in poison baits to control the mole cricket (*Gryllotalpa gryllotalpa*). Chlordane gave consistently satisfactory results, and was more effective and less dangerous than phosphide of zinc.—Stat. zool. agric. Sud-Ouest, Gironde.

3665. TROUILLON, L.-L.
Les éphippigères. **(The ephippigers.)**
Progr. agric. vitic., 1952, **137**: 287-9.

The technique successfully used with HCH against *Ephippiger bitterensis* on vines in Languedoc is described. Against young larvae the insecticide is sprayed or dusted. Only mixtures of HCH and bran are effective against the adults. Dry insecticide is mixed with the bran in the doses prescribed by the maker, and about 60-80 l. of water per 100 kg. of bran is then added. The bait is spread at the base of the vines either in the evening or the early morning at the rate of 50-80 kg. of wet bran per ha. and treatment is repeated after several days if necessary.

3666. COX, J. A.
The cherry fruit fly in Erie County.
Bull. Pa agric. Exp. Stat. **548**, 1952, pp. 17, bibl. 12, illus.

Two species of fruit fly are found in the cherry orchards of Erie County, Pennsylvania: the black cherry fruit fly (*Rhagoletis fausta*) and the light banded cherry fruit fly (*R. cingulata*). A description of the insects and their seasonal life history, a list of their food plants and the results of control experiments with various insecticides are given. Recommended control is 2 sprays of either lead arsenate (2 lb. per 100 gal.), parathion (4 oz. of active ingredient per 100 gal.), EPN-300 (1 lb. per 100 gal.) or methoxychlor (2 lb. per 100 gal.), the first spray being given soon after the flies appear, early in June, and the second about 10 days later. Lead arsenate sprays often injure the stems of English Morello.

3667. SALASCHEK, H.
Die erste Kirschfruchtfliegen-Grossbekämpfung mit regenfesten Nebelbelägen und ihre Auswirkung auf die moderne Pflanzenschutz-Geräteentwicklung. **(The first control measures carried out on a large scale against the cherry fruit fly with mist sprayers, and its effect on modern development of plant protection machines.)**
NachBl. dtsch. PflSchDienst., Braunschweig, 1952, **4**: 38-9, illus.

Spraying trials are described, carried out over an area carrying 14 to 15 thousand trees, for the control of the cherry fruit fly [*Rhagoletis cerasi*], using machines applying low-volume mist sprays. For 1 ha. 3 to 5 litres of a DDT solution was found sufficient.

3668. Syngrassides, A. J.
Experiments on mediterranean fruit-fly.
Countryman, Nicosia, 1952, **6**: 6: 14-17.

The results of 6 years' experiments to control *Ceratitis capitata* on deciduous fruits and citrus in Cyprus are summarized. They have shown that the fly can be controlled adequately and economically by a bait spray consisting of 6 drams [=0·672 oz.] DDT paste or wettable 50% DDT, 133 drams [=ca. 15 oz.] clensel in 10 okes [=ca. 2¾ gallons] water. Deciduous fruit trees should be sprayed as the fruit approaches maturity, while for mandarins forced for early market spraying should start in mid-September and be repeated weekly until the crop is harvested.

3669. Lathrop, F. H.
Fighting the blueberry fruit fly in Maine.
Bull. Me agric. Exp. Stat. **500**, 1952, pp. 34, bibl. 22, illus.

Details are given of the Maine blueberry industry and of the blueberry fruit fly, *Rhagoletis pomonella*, and its life history. Apart from cultural practices which assist control, the main recommendation is to apply a dust mixture consisting of 50% calcium arsenate, 10% monohydrated copper sulphate and 40% hydrated lime. This should be applied at 6 lb. per acre about 7 days after the flies begin to emerge and again after the first rain or within 14 days of the first application. Sometimes 3 applications are desirable. No berries should be picked for at least 14 days after the last dust application.

3670. Frick, K. E.
The value of some organic phosphate insecticides in control of grape mealybug.
J. econ. Ent., 1952, **45**: 340-1, bibl. 1, being *Sci. Pap. Wash. St. agric. Exp. Stats.* 1077.

One thorough spray of 1 lb. of 25% parathion wettable powder per 100 gal. gave excellent control of grape mealybug, *Pseudococcus maritimus*, when applied at the time the second generation was beginning to deposit honeydew on the grapes.

3671. Pieri, G.
Relazione sui trattamenti insetticidi polverulenti contro la cocciniglia cotonosa della vite, effettuati nel 1950. **(Experiments on the control of the vine mealybug with insecticidal dusts in 1950.)** [English summary 8 lines.]
Ann. Sper. agrar., 1952, **6**: 193-6, bibl. 3.

Liquid insecticides have the disadvantage of penetrating the grape; liquid phosphoric ester insecticides also dissolve the bloom, thus greatly reducing the commercial value of the fruit. Small scale experiments with parathion dusts were made at Conegliano Research Station in 1950. Field tests with 0·2% and 0·5% parathion in talc and in bentonite were inconclusive; the attacks did not recur but mortality was not determinable. In laboratory tests the 3 best results were given by 1% parathion in sulphur (80% mortality), 1% in bentonite (74%) and 0·5% in sulphur (72%). Further experiments are required, but parathion dust treatment to supplement liquid treatment after the appearance of the grapes is recommended.

3672. Manzoni, G., and Carli, E.
Prove di lotta invernale ed estiva contro la cocciniglia cotonosa della vite. **(Experiments in the winter and summer control of the vine mealybug.)** [English summary 14 lines.]
Ann. Sper. agrar., 1952, **6**: 171-92, bibl. 12, illus.

The control measures in use against the vine mealybug, *Pseudococcus citri*, have not been giving satisfactory results in any of the principal vine-growing districts in Italy. Experiments with a number of white oil and phosphoric ester insecticides were consequently undertaken at Conegliano. Summer treatment with the latter at 0·15–0·2‰ of the active principle, or at 0·3‰ in severe cases, is recommended, preferably shortly after the appearance of a new generation.

3673. Rovira Valle, F.
Les vignobles de Chincha attaqués par le phylloxera.* **(Phylloxera in the vineyards of Chincha [Peru].)**
Bull. Off. int. Vin, 1951, **24**: 244: 117-19.

Phylloxera was first reported in the Chincha vineyards in 1906 but remained unimportant for many years. Four years ago it suddenly developed intense activity and threatened the destruction of vineyards throughout the area. The sudden activity is considered to be due to a modification of the humidity factor.

3674. Nijveldt, W.
Galmuggen van cultuurgewassen. I. Galmuggen van fruitgewassen. **(The gall midges of cultivated plants. I. The gall midges of fruit trees and bushes.)** [English summary ⅔ p.]
Tijdschr. PlZiekt., 1952, **58**: 61-80, bibl. 18, illus.

Several gall midges are of economic importance to fruit crops in the Netherlands. Methods of studying their phenology and biology are here described. *Contarinia* and *Dasyneura* species cause some injury every year; *Ischnonyx prunorum* (the plum bud gall midge) has been observed occasionally in the province of Zeeland; *Thomasiniana oculiperda* causes injury in rose nurseries, but may also affect fruit trees. *T. theobaldi* has not yet been recorded for the Netherlands, but a description of it is included because it occurs in neighbouring countries.—Instituut voor Plantenziektenkundig Onderzoek, Wageningen.

3675. Cox, J. A.
A comparative study of organic insecticides for control of grape berry moth.
J. econ. Ent., 1952, **45**: 101-4, bibl. 4, being *Pap. J. Ser. Pa agric. Exp. Stat.* **1707**.

Results of a 3-year investigation on the control of grape berry moth, *Polychrosis viteana*, have shown DDT at the rate of 12 oz. per 100 gal. and parathion at 4 oz. per 100 gal. to be more effective than methoxychlor, TDE, TM-5 and TM-6. Ethyl p-nitrophenyl thionobenzenephosphonate at the rate of 0·25 lb. per 100 gal. was also quite toxic to the moth.

* See also 3517-3519.

3676. Woodside, A. M.
Control of the pear borer in apple trees.
J. econ. Ent., 1952, **45**: 98-101, bibl. 1.
Good control of new infestation by pear borer, *Thamnosphecia pyri*, in apple trees was obtained in Virginia with 3 sprays, containing parathion at the rate of 2 lb. of 15% wettable powder per 100 gal., applied during the flight period of the moths. One spray of 3 lb. of parathion or 2 lb. of p-nitrophenyl compound, and 2 sprays of 5 lb. of 50% DDT were also found effective against new infestations. For the satisfactory control of existing heavy infestations a two-year treatment is required, applying parathion or p-nitrophenyl in late May or early June each year.

3677. MacCreary, D., and Milliron, H. E.
Occurrence of the smartweed borer and the European corn borer in apples.
J. econ. Ent., 1952, **45**: 348, bibl. 3, being *Misc. Pap. Del. agric. Exp. Stat.* **147**.
The large number of dead larvae of the smartweed borer *Pyrausta ainsliei*, and European corn borer, *P. nubilalis*, found in dropped apples in an orchard in Delaware suggest that apples are unsuitable hosts for these two species of borer.

3678. Urlings, J.
Wanneer verschijnt de carpocapsa ? **(When do the codling moths emerge?)** [English summary 8 lines.]
Meded. Dir. Tuinb., 1952, **15**: 358-62.
Observations at Simpelveld (South Limburg) in 1951 have shown that if the normal development of the cocoons of the codling moth is interfered with, the appearance of the moths in spring is delayed. It is suggested that the time of application of control measures should be based on observations on caterpillars which have been disturbed as little as possible, i.e. when the first eggs are found.

3679. Hamilton, A.
Codling moth investigations in Nelson, 1948-49.
N.Z. J. Sci. Tech. Sect. A, 1952, **33**: 5: 90-7, bibl. 6, illus.
The results of bait-trap catches of moths are shown in graphs and tables. The catches were found to vary more or less with the evening temperature, but this correlation may be affected by other factors such as rain. There were two peak catches during the season, one between 9 and 17 December, the other reaching its maximum on 31 January.—D.S.I.R., Nelson.

3680. Taylor, G. G.
Spray treatments with lead arsenate for control of codling moth (*Cydia pomonella* L.) on apple trees.
N.Z. J. Sci. Tech. Sect. A, 1952, **34**: 59-64, bibl. 3.
In heavy infestations lead arsenate at 1½ lb. to 100 gal. applied at normal intervals of 14 to 18 days from petal-fall failed to give adequate control of codling moth. At 4½ lb. to 100 gal. there was little improvement in control and increased fruit and foliage injury, but reduction in the intervals between spraying to 8 days reduced codling moth damage.—D.S.I.R., Auckland.

3681. Solaroli, V., and Bongiovanni, G. C.
L'irrorazione al salice contro la *Carpocapsa pomonella* L. **(Calyx spraying against codling moth.)** [English summary 14 lines.]
Riv. Ortoflorofruttic. ital., 1951, **35**: 242-54, bibl. 33, illus.
Calyx spraying with 1% lead arsenate against *Cydia pomonella* was investigated in the Po valley. The best time for spraying was during the first 4-12 days after petal fall. Spraying is recommended only for those varieties in which the pest most commonly enters through the calyx.

3682. Michelbacher, A. E., and Bacon, O. G.
Codling moth on walnut.
Calif. Agric., 1952, **6**: 2: 5, 14, illus.
The results of spraying trials on Payne walnuts are summarized. Spraying can be delayed until the nuts have reached an average diameter of ½ in. Formulae are listed for lead arsenate, DDT, BHC and parathion applied by conventional sprayers, and for the last three applied by air-carrier sprayers.

3683. Peregončenko, B. M.
Something new in the control of fig moth. [Russian.]
Sad i Ogorod, 1952, No. 1, pp. 51-2.
An account is given of attacks by the fig moth in central Asia and of the damage caused. A 3% DDT spray was found to give very effective control in trials in 1950 and 1951.

3684. Lordello, L. G. E.
Nota sôbre *Enyo ocypete* (Linnaeus, 1758) (Lep., Sphingidae.) **(A note on *Enyo ocypete*.)** [English summary ½ p.]
Rev. Agric. Piracicaba, 1951, **26**: 299-302, bibl. 7, illus.
Although found attacking grape vines, the moth *Enyo ocypete* is of little economic importance. Some observations are made on the pupae and the taxonomy of the insect.

3685. Taylor, G. G.
Spray treatments for control of leaf roller (*Tortrix postvittana* Walker) in apple orchards.
N.Z. J. Sci. Tech. Sect. A, 1952, **33**: 5: 98-103, bibl. 3.
Results obtained indicate that, for leaf roller control, parathion at comparable dosages is much superior to DDT and is as effective as DDD, and is unlikely to cause fruit and foliage injury. It contributes to red mite and leaf hopper control. In orchards where the leaf roller is of major importance it is necessary at present to maintain a full programme of lead arsenate sprays. DDD and parathion are both of high potential value, but require further investigation before they can be recommended.—D.S.I.R., Auckland.

3686. Wagn, O.
Nyt skadedyr i frugtplantagen. **(A new orchard pest.)**
Erhvervsfrugtavl., 1951, **18**: 25-7, illus.
A mass incidence of the large yellow underwing (*Agrotis pronuba*) occurred in many Danish apple and pear orchards in the autumn of 1951. The caterpillars devoured the vegetation, leaving the ground

bare, and ate the fallen fruit. Even the fruit on low branches and in boxes after picking was attacked.

3687. HASE, A.
Über die Lebensweise des Bärenspinners *Hyphantria cunea* und über seine Einbürgerung und rasche Ausbreitung in Europa. **(The habits of the fall webworm, *Hyphantria cunea*, and its invasion and rapid distribution in Europe.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1952, **4**: 82-5, bibl. 22.

The fall webworm, *Hyphantria cunea*, has not yet been recorded in Germany, but, as there is a real danger that it will invade that country from neighbouring regions, its morphology, biology, host plants, which include mulberry, cherry, apple, pear, quince, walnut, small fruits and a number of ornamental shrubs, and distribution in Europe are outlined in order that it may be recognized, the danger noted, and control measures (with DDT-, ester-, and hexa-preparations) applied if necessary.—Biol. Zentralanst. für Land- und Forstwirtschaft, Berlin-Dahlem.

3688. CLARK, P. G.
The control of apple sawfly.
Fruitgrower, 1952, No. 2940, pp. 817-18.

In experiments carried out by Bugge's Insecticides on the control of apple sawfly on Worcester Pearmain apples in 1950, BHC and toxaphene were found to be most promising insecticides. In further trials in 1951 both BHC 50% wettable powder at 1 lb./100 gal., and toxaphene 20% emulsion at ½ gal./75 gal. applied at petal fall gave over 90% control, the toxaphene treatment also causing a considerable reduction in red spider population.

3689. BÖHM, H.
Beitrag zur Biologie und Bekämpfung der Apfel- und Birnensägewespe (*Hoplocampa testudinea* Klug., *Hoplocampa brevis* Klug., Hymenopt., Tenthredinidae.) **(A contribution to the biology and control of apple and pear sawflies.)** [English summary 11 lines.]
PflSch. Ber. Wien, 1952, **8**: 129-49, bibl. 35, illus.

Trials conducted in Austria in 1949-51 have shown parathion and BHC, applied shortly before emergence, to be most effective for the control of apple- and pear-sawflies. A similar treatment with nicotine was less effective, but repeated applications gave good results. DDT was found unsatisfactory.

3690. PHILIPP, W.
Zur Blausäurebegasung der Obstbäume. **(Fumigating fruit trees with hydrocyanic acid gas.)**
NachrBl. dtsch. PflSchDienst, Braunschweig, 1952, **4**: 9-12.

Experiments for the control of San José scale on black currant plants showed that fumigation with 6 g. HCN per cu.m. for 50-60 min. was sufficient to exterminate the scales, provided that circulation and heating of the gas was ensured in the fumigation chamber. Without good circulation and with a fully charged chamber the above should be increased by 10 g./cu.m. and 1 hr. The temperature of the gas chamber should not drop below 5° C. Drops of water on the plants do not hinder the action of the fumigant, but a thick layer of soil on the plant does adversely affect it.

3691. DEL CAMPO, E.
Tratamiento contra el arañuelo. **(Control of *Liothrips oleae*.)**
Bol. Oleic. int., 1951, No. 4, pp. 27-35.

The olive thrips, *Liothrips oleae*, is endemic in Liguria and the Spanish provinces of Jaen and Toledo. Its morphology and biology are briefly dealt with. It attacks the leaves causing curling, blotching and sometimes defoliation. The defoliation affects the quality of the fruit, may cause the death of twigs, and in extreme cases results in the loss of the tree. The pest can be effectively controlled by fumigation with hydrocyanic gas between early October (harvest time) and early March (the pruning season).

Antibiotics.

(*See also* 3762, 3765, 4090, 4124m, 4146.)

3692. BHIDE, V. P., MONIZ, L., AND PATIL, R. B.
Actinomycetes antibiotic to plant-pathogenic bacteria.
Curr. Sci., 1952, **21**: 70-1.

Seven out of 64 unidentified cultures of actinomycetes inhibited 3 or more of 18 species of *Xanthomonas*. Two other *Xanthomonas* spp. were not inhibited. Some of the cultures also gave promising results against *Sclerotium rolfsii*.

Fungicides.

(*See also* 3545.)

3693. ANON.
Crawley Research Station.
World Crops, 1952, **4**: 95-7, illus.

The work of the Technical Department of Bayer Agriculture, Ltd., Surrey, England, on fungicides is outlined.

3694. YARWOOD, C. E.
Fungicides for powdery mildews.
Proc. 2nd int. Congr. Crop Prot., 1949, London, 1951, pp. 500-21, bibl. 17, illus.

Tests were made at the University of California to ascertain the toxicity of various fungicides to the powdery mildew, *Erysiphe polygoni*, on *Phaseolus vulgaris* and to a limited extent to *E. cichoracearum* on cucumber, cantaloupe, *Calendula* and chrysanthemum, *Sphaerotheca pannosa* on rose and peach, *S. humuli* on strawberry, *Uncinula necator* on vine and *Podosphaera leucotricha* on apple. The most promising sprays tested were lime-sulphur, wettable sulphur, copper acetate, malachite green, the dicyclohexylamine salt of 2-4-dinitro-6-cyclohexyl phenol, tetrachloronaphthoquinone, actidione and dinitro capryl phenyl crotonate. Lime-sulphur was best for sulphur-tolerant crops and crotonate for sulphur-sensitive hosts.

Insecticides.

(*See also* 3545, 3713a, z, 4506.)

3695. BOTTGER, G. T., AND YERINGTON, A. P.
Comparative insecticidal value of EPN, methyl ethyl parathion, methyl parathion, and parathion.
J. econ. Ent., 1952, **45**: 131, bibl. 2.

Tables are presented showing the toxicity of dusts containing these insecticides to celery leaf tier, *Phylctaenia rubigalis*; citrus red mite, *Paratetranychus citri*; large milkweed bug, *Oncopeltus fasciatus*; and pea aphid, *Macrosiphum pisi*.

3696. CANO, F.
Efficienza insetticida di alcuni oli distillati dal petrolio nei trattamenti invernali. (The insecticidal efficiency of several petroleum oils used as dormant sprays.) [English summary 4 lines.]
Riv. Ortoflorofruttic. ital., 1952, **36**: 34-8, bibl. 6.
Experiments with five petroleum distillates on apples, mulberries, and pears at Cesena showed that their insecticidal efficacy against *Aspidiotus perniciosus* and *Diaspis pentagona* did not agree with their chemical and physical properties. Instead of increasing with viscosity, density and % of high-boiling fraction, toxicity almost always did the opposite. This was particularly apparent with viscosity, oils with a viscosity of less than 3° Engler at 25° C. being distinctly more active than those with higher viscosity.

3697. RICHMOND, G. L. G.
Systemic insecticide.
Essex Fmrs' J., 1952, **31**: 2: 15-16.
Brief advice is given on the use of Pestox 3 (octamethyl pyrophosphoramide) on top fruit, nursery stocks, hops, soft fruit, beets and mangolds, and flowers under glass.

Spray apparatus and technique.

(*See also* 3713n.)

3698. POTTER, C.
An improved laboratory apparatus for applying direct sprays and surface films, with data on the electrostatic charge on atomized spray fluids.
Ann. appl. Biol., 1952, **39**: 1-28, bibl. 22, illus.
The design and performance are described of a laboratory spraying apparatus for the study of insecticides and fungicides. The apparatus is an improved version of an earlier one [see *H.A.*, 11: 776]. It can give good replication and an even distribution and may be used with a variety of media. Closely controlled conditions are not necessary for good replication. Tests indicated that variations in electrostatic charge on the droplets were not likely to cause variation in the amount deposited. It was concluded that the main cause of variations in deposit was likely to be difference in the amount of turbulence occurring in the spray tower, but there were probably other causes not yet recognized. The weight of deposit must therefore be checked constantly.

3699. BOWEN, H. D., HEBBLETHWAITE, P., AND CARLETON, W. M.
Application of electrostatic charging to the deposition of insecticides and fungicides on plant surfaces.
Agric. Engng St. Joseph, Mich., 1952, **33**: 347-50, bibl. 4, illus.
The main advantages of adding controlled electric charging to the conventional insecticidal and fungicidal dust application process are a considerable saving in the applied quantity of dust required to afford protection to a particular crop, and a better and more even coverage of plant surface. The distribution of dust on the plant surface as observed in 1951 showed a slight but definite advantage in favour of charged dust, but further improvements of the method are sought. The mechanics of the process and the apparatus used are described and illustrated.

3700. HERRBACH, E. F.
Concentrate spraying.
Trans. Ill. St. hort. Soc. for 1951, 1952, pp. 90-102.
The various conditions which must be satisfied for successful concentrate spraying are detailed. Absence of run-off can reduce the quantity of toxicant required, but size of droplet is important in obtaining satisfactory coverage, as is speed of sprayer. Trees treated must not be higher than 20 ft. Results are given of trials on apples for the control of codling moth, scab, red-banded leafroller and curculio in 1950/51.

3701. VAN DEN MUIJZENBERG, E. W. B., AND OTHERS.
De nevelspuit in de fruitteelt. **(Concentrate-spraying in orchards.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1952, **15**: 62-79, bibl. 7, illus.
Low volume mist spraying or concentrate spraying is here discussed under four headings by different authors. 1. The possibilities of concentrate spraying. 2. The mist spray and its action. 3. The application of the mist spray. 4. Motor spraying and concentrate spraying compared from an economic point of view. It is possible to apply mist sprays at a concentration 10 times that applied with conventional sprayers. Experiments over several years have shown that the control of scab was at least as effective with concentrate as with conventional spraying, in some cases even better. The smaller volume of spray to be applied and the saving of labour reduces spraying costs considerably.—Instituut voor Tuinbouwtechniek, Wageningen.

3702. PATERSON, J. J., AND SHANKS, G. L.
The effects of weed and insect sprays on spraying equipment materials.
Sci. Agric., 1952, **32**: 190-203.
On the basis of results obtained in experiments at the University of Manitoba, recommendations are made for both operators and manufacturers on the care of spraying equipment and materials used for their construction.

3703. ANON.
A new aerosol that saves labour.
Grower, 1952, **37**: 1328-9, illus.
A brief description is given of a continuous-flow aerosol, the Aerosap, made by Shepherds Aerosols Ltd. The unit contains a heating element and a cup holding DDT, BHC, sulphur, or azobenzene alone or in combination. Each container will last for the

equivalent of 4-5 weeks continuous burning. Units can be hired.

3704. Jacks, H.
A field injector for soil fumigation.
Orchard, N.Z., 1952, **25**: 3: 9-13, illus.
The requirements for an efficient field injector are set out and initial tests with two types are described, (1) gravity feed and (2) constant pressure. The disadvantages of the former type are briefly mentioned. The constant pressure injector is described in detail, with instructions for its use.—D.S.I.R., Auckland.

Spray damage and residues.

3705. Ceccarelli, V.
Il comportamento della poltiglia bordolese usata nei trattamenti della vite, in zone ove l'atmosfera è inquinata da gas solforosi. **(The action of bordeaux mixture used for the treatment of vines in areas where the atmosphere contains sulphurous fumes.)**
Reprinted from *Ricerca sci.* 1950, **20**, No. 6, as *Pubbl. Ist. Pat. veg. Milano* **10**, pp. 2, illus.
The deposits from bordeaux mixture applied to vines to control downy mildew [*Plasmopara viticola*] in an atmosphere containing sulphurous fumes turn darker than usual and become leaden and metallic looking. Patches on the leaves sometimes become yellow and necrotic and the whole surface may be affected.

3706. Ciferri, F.
Rapporti tra trattamenti invernali ai fruttiferi ed idratazione dei rametti. **(The relation between winter spraying of fruit trees and the water content of the young branches.)** [English summary 8 lines.]
Not. Mal. Piante, 1952, No. 18, pp. 20-6, bibl. 10.
The water content of fruit trees, after winter treatment with carbolineum or with white oil, is greater than that of untreated trees, up to a maximum of about 42% for carbolineum and 35% for white oils. This higher water content may possibly make treated trees more sensitive to damage by frost, particularly late frosts.

3707. Wylie, W. D.
Do insect[icide]s in the soil damage plants?
Ark. Fm Res., 1952, Vol. 1, No. 1, p. 4.
Observations made on Elberta peach trees and cover crops in Arkansas indicate that accumulation of insecticides in the soil is injurious to plant growth. Of the 7 insecticides tested in this study, all of which are being used at least experimentally for control of peach insects, BHC had the most adverse effect on growth and lead arsenate the least.

3708. Reich, H.
Hühnerhaltung und Obstbaumspritzung. **(Poultry keeping and fruit tree spraying.)**
Mitt. ObstbVersuchsrings Jork, 1951, **6**: 161-3.
Experiments have shown that apart from Fuklasin and Pomarsol, which can be replaced by Nirit or wettable sulphur, the standard chemicals used in Germany for fruit tree spraying are not toxic to poultry in the amounts found under treated trees.

3709. Tilemans, E., and Dormal, S.
Toxicité des produits phytopharmaceutiques envers l'homme et les animaux à sang chaux. **(The toxicity of pest control materials to man and warm blooded animals.)** [Summaries in Dutch, German, and English, ¼ p.]
Parasitica, 1952, **8**: 64-91.
The different symptoms of toxicity are reviewed, and attention is called to the possibility of chronic poisoning by the accumulation of some materials in the system. The authors give the mean lethal doses, by oral administration for man and different warm blooded animals, for 60 insecticides and fungicides, with toxicity symptoms, pathology, and the antidotes to be used in cases of poisoning. Instructions are given for handling the compounds and how to apply them safely.

3710. Galley, R. A. E.
Problems arising from the use of chemicals in food. The toxicity of residual agricultural chemicals.
Martin, J. T.
Idem. Agricultural spray residues.
Parsons, A. T.
Idem. Inorganic residues in food.
Frazer, A. C.
Idem. Pharmacological aspects.
Adams, C. A.
Idem. The legal and administrative background.
Chem. Ind. Lond., 1952, No. 16, pp. 342-4, and pp. 345-50, bibl. 7 ; No. 18, pp. 384-8, bibl. 24; No. 21, pp. 456-8, bibl. 9; and No. 22, pp. 484-7.
The first author gives the chemical formulae of the more important new insecticides and herbicides and toxicological data relating to them. The second indicates the main uses in spray programmes of lead arsenate DDT, BHC, organo-phosphorus and azobenzene preparations and the copper and mercury fungicides, with particular reference to residues that may be left on crops at the time of harvest. It is concluded that, if normal recommendations for the application of materials are followed and the precautions issued are observed, there is little risk of significant residues occurring on the produce. The third author in considering inorganic residues in food opens his review with tabulated data on trace elements that are naturally present, sometimes in significant proportions, in various vegetable and mineral products. Inorganic residues may arise from harvesting, drying, etc., spraying, notably with compounds containing copper, arsenic and fluorine, processing, the use of inorganic adjuncts in manufacture, and packing, under which is included canning. The elements that may enter foods are classified in accordance with their effect upon the human system and the subject of legal tolerances is discussed briefly. The fourth author deals with the problems associated with food additives and the fifth with regulations to protect the consumer and their administration.

3711. Pieri, G., and De Rosa, T.
Studio dell'eventuale azione degli esteri fosforici sulla fermentazione alcoolica. **(A study of the effects of phosphoric esters on alcoholic fermentation.)** [English summary 9 lines.]
Ann. Sper. agrar., 1952, **6**: 197-206, bibl. 5.
Field and laboratory experiments were carried out at Conegliano Research Station in 1950 on the effect of liquid phosphoric ester treatment of vines on alcoholic fermentation. Fosferno, an insecticide containing 20% parathion, was used at a concentration of 75 g. per 100 l. of water and there were 5 treatments: (1) control—no spraying; (2) sprayed 1 August; (3) sprayed 1 Sept.; (4) sprayed 28 Sept.; and (5) sprayed 1 August and 1 and 28 Sept. The grapes were pressed on 10 October. The phosphoric esters had a negligible effect on alcoholic fermentation and their use is suggested at least until 8-10 days before harvesting.

3712. Arthington, W., and Hulme, A. C.
The estimation of mercury on the peel of apples.
Analyst, 1951, **76**: 211-15, bibl. 10.
A technique is described for the estimation of mercury (as spray residues) on the skins of apples; after freeze-drying the tissues, which are digested with a nitric-sulphuric acid mixture, the mercury is extracted and estimated by means of dithizone, the reversion technique of Irving, Andrew and Risdon being used. [From authors' abstract.]—D.S.I.R., Ditton Lab., East Malling.

Noted.

3713.

a Ayoutantis, A., and Kortzas, C.
L'importance des dégâts occasionnés à la viticulture par diverses causes. **(Damage caused in Greek vineyards by insect pests.)**
Bull. Off. int. Vin, 1951, **24**: 244: 105-11.

b Brien, R. M., and Dingley, J. M.
A revised list of plant diseases recorded in New Zealand.
Bull. D.S.I.R. N.Z. **101**, 1951, pp. 62, bibl. 169, 5s.

c Carvalho, J. C.
Nematodes das raízes encontrados em São Paulo. **(Root nematodes found in São Paulo [Brazil].)**
Arq. Inst. biol. S. Paulo, 1950/51, **20**: 165-72, bibl. 10, illus.

d Castro, R.
La pyrale, l'altise, le cigarier et l'érinase dans le vignoble espagnol. **(*Sparganothis pilleriana, Haltica lythri, Byctiscus betulae* and *Eriophyes vitis* in Spanish vineyards.)**
Bull. Off. int. Vin, 1951, **24**: 244: 62-6.

e Castro, R.
Ampélophages des racines et des souches de vigne, étudiés dans le vignoble espagnol. **(Root and fruit parasites of the vine in Spain.)**
Bull. Off. int. Vin, 1951, **24**: 244: 67-79.

f Castro, R.
Dégâts causés au vignoble espagnol par les insectes et autres animaux. **(Damage done in Spanish vineyards by insect and other pests.)**
Bull. Off. int. Vin, 1951, **24**: 244: 79-87.

g Courshee, R. J.
An hypothesis on the use of frost fans, their size, horsepower consumption and area protected.
N.I.A.E. tech. Mem. **47/1036/51/hort.**, 1951. pp. 18, bibl. 10.

h Démetriades, S.
Les maladies de la vigne en Grèce et les mesures de protection. **(Vine diseases in Greece and their control.)**
Bull. Off. int. Vin, 1951, **24**: 244: 111-13.

i Dunn, E.
Eelworm disease of horticultural crops.
Reprinted from *Roy. Caledonian hort. Soc. J.*, 1951, No. 6, as *Misc. Publ. Edinb. Coll. Agric.* **89**, 1951, pp. 4.
Symptoms described for strawberries, potatoes, vegetables and ornamentals with brief notes on control.

Entomological Branch, Department of Agriculture, N.S.W.
Mealy-bugs (Pseudococcinae) [and their control].
Agric. Gaz. N.S.W., 1952, **63**: 145-7, illus.

k Hafiz, A.
Powdery mildew of grape vines.
Punjab Fruit J., 1951/1952, **15**: 52: 8-9.
The disease and its control.

l Harper, R. S.
Canning peaches in the Goulburn Valley. Economics of pest and disease control.
J. Dep. Agric. Vict., 1952, **50**: 118-23, 135, illus.

m VIth International Vine and Wine Congress.
Phytopathologie. La défense sanitaire et la protection des vignobles. **(Phytopathology. Maintenance of the health of vineyards.)**
Bull. Off. int. Vin, 1951, **24**: 244: 13-24, 25-30, 31-2, 32-8, 39-48, 48-50, 50-2, 52-60, 60-1.
Reports for France, Greece, Iran, Israel, Italy, Luxemburg, Morocco, Portugal and Tunisia.

n Mauch, A.
Die Ergebnisse der Versuche mit leistungsfähigen Spritzen und Sprühnebelgeräten. **(Results of trials with efficient spray and mist blowing apparatus.)**
Mitt. ObstbVersuchsrings Jork, 1952, **7**: 66-9, illus.

o MINISTRY OF AGRICULTURE, LONDON.
The mussel scale.
Adv. Leafl. Minist. Agric. Lond. **36**, 1952, pp. 3, illus., 2d.
Lepidosaphes ulmi and its control.

p MINISTRY OF AGRICULTURE, LONDON.
Powdery mildew of the vine.
Adv. Leafl. Minist. Agric. Lond. **207**, 1952, pp. 4, illus., 2d.

q MINISTRY OF AGRICULTURE, LONDON.
Apple and pear scab.
Adv. Leafl. Minist. Agric. Lond. **245**, 1952, pp. 6, illus., 2d.
Control measures.

r MINISTRY OF AGRICULTURE, LONDON.
Silver leaf disease of fruit trees.
Adv. Leafl. Minist. Agric. Lond. **246**, 1952, pp. 8, illus., 2d.

s MINISTRY OF AGRICULTURE, LONDON.
Leopard moth [*Zeuzera pyrina*].
Adv. Leafl. Minist. Agric. Lond. **259**, 1952, pp. 2, illus., 2d.

t MINISTRY OF AGRICULTURE, LONDON.
Reversion in black currants.
Adv. Leafl. Minist. Agric. Lond. **277**, 1952, pp. 6, illus., 2d.
Symptoms, transmission, control measures and certification.

u NAITO, N.
Studies on *Gloeosporium olivarum* Alm. causing the olive anthracnose. [Japanese with English summary ⅓ p.]
Tech. Bull. Kagawa agric. Coll., 1950, **2**: 23-6, bibl. 4.
Temperature relations of the pathogen.

v NAITO, N., AND TANI, T.
The influence of phytohormones on the conidial germination of *Gloeosporium olivarum* Almeida causing the olive anthracnose. [Japanese with English summary ⅓ p.]
Tech. Bull. Kagawa agric. Coll., 1950, **2**: 27-30, bibl. 4.
Stimulation of germination and inhibition of germ tubes by NAA and 2,4-D.

w SCHØYEN, T. H., AND RAMSFJELL, T.
Skadedyr og sjukdommer som kan spreies med frukttraer og baerbusker fra planteskoler. **(Pests and diseases that may spread from top and bush fruit nursery.)**
Reprinted from *Gartneryrket*, 1952, No. 14, pp. 17, illus.
Listing and illustrating 36 pathogens, including viruses.

x STAFFORD, E. M., AND KIDO, H.
Grape bud mite studies.
Calif. Agric., 1952, **6**: 4: 4.
Studies on the seasonal cycle of the mite [*Eriophyes vitis*].

y STATENS PLANTEPATOLOGISKE FORSØG.
Svampesygdomme på aebler under opbevaringen. **(Fungus diseases of stored apples.)**
[*Publ.*] *Stat. plantepat. Forsøg, Lyngby*, 1952, 1 colour plate.
Eight diseases are illustrated.

z TILEMANS, E. M.
Quelques nouveautés au sujet des insecticides. **(Certain features of the newer insecticides.)**
Bull. agric. Congo belge, 1952, **43**: 71-94.

WEEDS AND WEED CONTROL.

(*See also* 3744h, j, 4509, 4527.)

Particular weeds.

3714. HOLLY, K., WOODFORD, E. K., AND BLACKMAN, G. E.
The control of some perennial weeds in permanent grassland by selective herbicides.
Agriculture, Lond., 1952, **59**: 19-23.

This paper includes a general account of the results of experiments with MCPA and 2,4-D (DCPA) to control several common weeds, including creeping buttercup (*Ranunculus repens*), meadow buttercup (*R. acris*), creeping thistle (*Cirsium arvense*), spear thistle (*C. vulgare*), marsh thistle (*C. palustre*), ragwort (*Senecio jacobaea*) and the common rush (*Juncus effusus*). In general, MCPA has given better control of buttercups and thistles than 2,4-D, both have proved equally effective against rushes, while 2,4-D has given the better control of ragwort. In these experiments the bulbous buttercup (*R. bulbosus*) and the ground thistle (*Cirsium acaule*) have proved resistant to both herbicides.—Dep. Agric., Oxford.

3715. PASTURE SECTION, COLLEGE OF AGRICULTURE, CEDARA.
The control of American bramble.
Fmg S. Afr., 1952, **27**: 283-4, 288, bibl. 4, illus.

The American bramble is becoming a serious weed in the high rainfall areas of Natal. Successful control with little or no subsequent sucker growth was obtained with both spring and autumn applications of a mixture of 2,4-D and 2,4,5-T applied at about 100 gal. per acre. The mixture consisted of 1·6 lb. 2,4-D and 0·8 lb. 2,4,5-T (ester) per gal. carrier. A dilution of ¼ gal. of mixture to 100 gal. water was as effective as higher concentrations and the cost of materials would be about £1 per acre of a pure stand of brambles.

3716. NYLUND, R. E.
Control of crabgrass in lawns.
Minn. Hort., 1952, **80**: 89, 95, illus., being *Pap. misc. J. Ser. Minn. agric. Exp. Stat.* 779.

Satisfactory control was obtained by applying 10% liquid PMA [phenyl mercuric acetate] at the rate of 2 fluid oz. per 2½ gal. water per 1,000 sq. ft. of lawn when the first seedlings appeared in late June or early July, and again 7-10 days later. The addition of half a teaspoonful of wetting agent such as Dreft or Vel was advantageous.

3717. TIMMONS, F. L.
India fights a land invader.
Foreign Agric., 1952, **16**: 99-102, illus.

An account is given of the efforts being made in India to reclaim large tracts of territory invaded by the wild sugar cane, kans grass (*Saccharum spontaneum*), by deep ploughing followed by shallow cultivation. Preliminary experiments on chemical control are also in progress.

3718. Clark, L. R., and Clark, N.
A study of the effect of *Chrysomela hyperici* Forst. on St. John's wort in the Mannus Valley, N.S.W.
Aust. J. agric. Res., 1952, **3**: 29-59, bibl. 10.

In 1948-49 an intensive ecological study was carried out of the effect on St. John's wort, *Hypericum perforatum* var. *angustifolium*, of a population of *Chrysomela hyperici* resulting from the liberation of 60,000 adults in 1944. Owing to a number of described factors the weed has maintained its position in the face of heavy insect attack.

3719. Blair, B. O., and Fuller, W. H.
Translocation of 2,4-dichloro-5-iodophenoxyacetic acid in velvet mesquite seedlings.
Bot. Gaz., 1952, **113**: 368-72, bibl. 3, illus.

Four days after the application of radioactive 2,4-DI^{131} to velvet mesquite seedlings, *Prosopis juliflora* var. *velutina*, less than 3% of the material was found to have moved from the treated tops to more basal tissues. This slow translocation may indicate why 2,4-D and similar compounds have given erratic results when applied as herbicides on mature velvet mesquite trees.

3720. Wilson-Jones, K.
Three experiments in witchweed control.
Emp. J. exp. Agric., 1952, **20**: 98-102, bibl. 3.

Excellent control of *Striga hermonthica* was obtained in 2 trials in the Sudan by spraying the host plant, in this case sorghum, with the sodium salts of MCPA and 2,4-D, 14 to 28 days after sowing. Control was less satisfactory when spraying was delayed until 35 days. In a third experiment, for reasons that are obscure but may be associated with very dry conditions, the hormones killed the sorghum.

Weed control in fruit crops.

(*See also* 3744c.)

3721. Scarascia, G.-T.
Reazioni di alcuni fruttiferi al 2,4-D. **(The reactions of certain fruit tree species to 2,4-D.)** [English summary 9 lines.]
Ann. Sper. agrar., 1952, **6**: 213-25, bibl. 24, illus.

A study was made at the Fruit-growing and Electrogenetic Institute, Rome, in 1949 and 1950 of the reactions of peach, plum, almond, pear and apple trees and vines to the hormone weed-killer 2,4-D. The herbicide used was Barweed (1‰≡0·7‰ pure hormone). The 2 experiments conducted were (1) direct spraying and (2) spraying of weeds only in orchards. In the first the trees and vines were sprayed in late May and early June with 1‰ Barweed. Apple was the least susceptible, suffering only a short retardation of growth, a slight curvature of the branches and the loss of a few leaves. The other species of fruit trees suffered much more heavily, the current year's growth being killed. In vines the epigeal parts were killed in a fortnight and root suckers which appeared after a month or more had abnormal leaves. In the second experiment 4 concentrations of Barweed (1, 1·25, 1·5, 2‰) were applied in May at 2,000 l. per ha. The 2 stronger solutions were entirely effective against the weeds (except Gramineae) and had no ill effects whatsoever on fruit trees or vines.

3722. Cross, C. E.
Weeds of the Massachusetts cranberry bogs. Part I. The grasses.
Bull. Mass. agric. Exp. Stat. **463**, 1952, pp. 55, illus.

Methods of weed control in cranberry bogs include hand pulling, mowing and the use of chemicals, particularly kerosene, Stoddard solvent, ferric sulphate and copper sulphate. Descriptions with detailed illustrations are given of 14 of the commonest grass weeds of cranberry bogs with appropriate recommendations for control.

3723. Denisen, E. L.
Chemical weed control for strawberries.
Ia Fm Sci., 1952, **6**: 157.

In 2 years' tests at Ames, Iowa, Crag Herbicide 1 (=sodium 2,4-dichlorophenoxy ethyl sulphate), applied as a spray at 4 lb. in 50-100 gal. water per acre, effectively controlled weeds in both common and everbearing strawberries without detriment to the plants or their yields apart from a slight reduction in the number of runners formed. As this herbicide only acts against germinating weeds the beds should be free of weed plants when spraying is started.

3724. Hemphill, D. D.
Chemical weed control in strawberries.
Down to Earth, 1952, **7**: 4: 8-10, illus.

With regard to the status of 2,4-D in strawberry growing it may be stated: (1) that most varieties of strawberry are somewhat resistant to 2,4-D for they will tolerate a dosage that will kill many broad-leaved and " grassy " weeds, (2) that the stage of development of weeds when treated is an important factor in determining degree of control, (3) that there are critical stages in the development of the strawberry plant when damage is more likely to result, (4) that environmental conditions such as temperature, rainfall and soil characteristics affect degree of weed control and plant injury, and (5) that 2,4-D has not solved all the weed problems in strawberries. Its use for pre-planting, summer, foliage, autumn, pre-harvest, and post-harvest applications is discussed.—Mo. agric. Exp. Stat.

3725. Anon.
Hormone weedicides kill grapevines.
J. Dep. Agric. S. Aust., 1952, **55**: 404, illus.

Serious damage to grapevines as a result of spraying weeds amongst vines and on headlands is described; canes were killed and leaves deformed by 2,4,5-T, especially the highly volatile ester forms. If hormone weedicides have to be used in or near vineyards the less volatile MCPA should be used and every precaution taken to prevent its contact with the vines.

Weed control in vegetables and tobacco.

(*See also* 3744b.)

3726. Bremer, H., and others.
Unkrautbekämpfung. **(Weed control.)**
Verlag Kommentator G.m.b.H, Frankfurt Main, 1952, pp. 40, bibl. 10, illus.

The pamphlet, which is published by the German Ministry of Food, Agriculture and Forestry, contains contributions by seven experts. Weed control in potatoes and vegetables and the effect of hormone herbicides on bees are among subjects discussed.

3727. Åvall, H.
Ogräsbekämpning med kemiska medel i konservärtodlingar. **(Trials with weed killers in canning peas.)** [English summary ½ p.]
Medd. Trädgårdsförs. Malmö **74**, 1952, pp. 14, bibl. 13.

Of the chemicals tested in Sweden in 1950 and 1951 Sevtox (dinitrobutylphenol) applied at the rate of 4 l. per ha. when the peas were 8-10 cm. high, and Agroxone applied at 3·5 l. when the plants were somewhat taller, proved most satisfactory and increased the yield of pods by 17 and 11% respectively. Herbicidal treatment is considered economical when there are more than 50 weeds per sq. m. and best results are obtained when the chemicals are applied during fine warm weather with dew still on the plants.

3728. Eggink, H. J.
Le désherbage chimique des pois. **(Chemical weeding of peas.)**
Maandbl. LandbVoorlDienst, 1952, No. 3, from abstr. in *Rev. Agric. Brux.*, 1952, **5**: 609.

Three effective treatments are quoted, viz. (1) cyanamide, when the peas emerge or are about 5 cm. tall, preferably when dry, (2) butylphenol, 1 kg. in 1,000 l. of water per ha. when the R.H. is less than 80% and the temperature is below 20° C., but not during flowering, and (3) DNC, 3-4 days before emergence.

3729. Linser, H.
Keimversuche mit Adsorptionsschutz der Samen in 2,4-D-behandeltem Boden. **(Germination trials with adsorption protection of seeds in soils containing 2,4-D.)** [English summary 4 lines.]
PflSch. Ber. Wien, 1952, **8**: 65-74, bibl. 5, illus.

It was found that peas and other seeds given a protective coating of activated carbon were not affected by 2,4-D in soils previously treated with that compound for weed control.

3730. Hiele, F. J. H.
Les degats causés aux pommes de terre par les plants adventices. **(Weed damage in potato crops.)**
Maanbl. LandVoorlDienst, 1952, No. 1, from abstr. in *Rev. Agric. Brux.*, 1952, **5**: 130.

Weeds reduced potato yields by 20-30%, being particularly harmful in the early stages.

3731. Noll, C. J., and Odland, M. L.
Influence of time of application of certain herbicides on pre-emergence weeding of spinach.
Progr. Rep. Pa agric. Exp. Stat. **68**, 1952, pp. 4, illus.

Of the 7 proprietary herbicides tested at the Pennsylvania Agricultural Experiment Station, 4 were found to be suitable for weed control in spinach. The optimum time and rates of application were as follows: Shell oil 130, 6 gal. per acre—2nd, 3rd and 4th day after planting; ACP644, 3 gal. per acre—1st to 6th day after planting; 40% Cloro IPC, 1 gal. per acre—day of planting; and Stoddard Solvent, 100 gal. per acre—3rd to 5th day after planting.

3732. Thomson, R.
Control of weeds in tobacco seedling beds.
N.Z. J. Sci. Tech., Sect. A, 1952, **33**: 6: 74-7, bibl. 6.

In the trials described none of the substances tested was so effective as steam. Calcium cyanamide gave marked reduction of weeds, but it must be applied 90 days before seeding. Chloropicrin gave only fair control of weeds, but it is very useful in tobacco seedling beds because of its fungicidal properties; for its effective penetration and distribution a minimum soil temperature of 45° F., preferably higher, is necessary.—D.S.I.R., Motueka.

Weed control in ornamentals.

3733. Dewson, I. B.
Gladiolus weeder.
Flor. Rev., 1950, **106**: 2734: 38-9, from abstr. in *Bull. N.Y. St. Flower Grs*, 1952, No. 80, p. 5.

Pre- and post-emergence spraying of gladiolus plantings with TAT G-W (a material containing phenyl mercuric acetate and 2,4-D as active agents) gave excellent kill of weeds, especially crab grass and broad leaf types. TAT G-W did not damage plants, and corms from treated plots flowered normally the following season.

3734. Jenkins, J. M., Jr.
Chemical weed control in gladiolus.
Down to Earth, 1951, **7**: 2: 4.

Tests showed that 2,4-D gave satisfactory weed control when applied as a pre-emergence spray in gladiolus plantings at the rate of 3 lb. per acre (amine form). Results have been consistently good for autumn planting in August, but less so with the spring crop. No injury to the gladiolus plants has been observed over a period of 3 years in 6 tests.—N.C. agric. Exp. Stat.

Weed control in tropical crops.

(*See also* 3744g, i, 4311, 4416, 4479.)

3735. Blackburn, F. H. B., Hanschell, D. M., and Clarke, M.
Some aspects of weed control in Trinidad.
Proc. 1951, Mtg B.W.I. Sugar Tech., British Guiana, pp. 123-34, bibl. 8.

The results of a survey of Trinidad sugar cane fields

have shown that the most abundant and often dominant weed species are annual grasses and herbs, while the creeping perennial grasses, which were formerly important and difficult to control, have been largely eliminated by deep mechanical cultivation in the dry season. The standard method of weeding, with cutlass or hoe, is inefficient and, moreover, makes heavy demands on a labour force already fully engaged in other essential operations. Under these conditions pre-emergence weed control with the sodium salt of 2,4-D has proved highly successful. [Authors' summary.] The weeds occurring in Trinidad cane fields are listed with reference to their abundance, growth form and response to 2,4-D contact spray.

3736. KNUST, H. G.
Chemical weed control [in sugar cane].
Cane Grs' quart. Bull., 1952, **15**: 77-9, illus.
In field trials with sugar cane on friable soils 2,4-D applied at the rate of 4 lb. in 20 gal. water per acre largely prevented the development of grass and weed seeds without interfering with the germination of the cane. Subsequent growth of weeds and grasses was effectively dealt with, when young, by applying 70-85% creosote or mineral oil with 3-6% pentachlorphenol and 3-5% 2,4-D at the rate of 4 gal. of the mixture to 50-60 gal. water. The contact spray was most effective when applied in the warmer part of the day and should not be applied to the cane leaves as it is prone to burn them.

3737. EVANS, H.
The control of weeds with selective synthetic herbicides in the colony of Mauritius.
Plant Prot. Overs. Rev., 1951, **2**: 1: 10-19, illus.
Notes are given on the control with MCPA and DCPA (2,4-D) of a number of weed species in Mauritius. Among these are *Hydrocotyle bonariensis*, *Artemisia vulgaris*, *Ambrosia artemisiifolia*, *Paederia foetida*, *Cyperus rotundus*, *Lantana camara*, *Cordia macrostachya* and *Tridax procumbens*. A contoured map shows the distribution of the first four. Trials on the effect of increasing dosages of ammonium DCPA and of MCPA on the chief sugar cane variety showed that the former is much more toxic than the latter. Doses of up to 3 lb. per acre merely delayed growth but progressively higher doses had more serious effects. Liquid MCPA, on the contrary, did little damage even at 1% active acid (10 lb. per acre). The dosages of selective herbicides normally used in sugar cane plantations are up to 5 lb. per acre.

Herbicides and apparatus.

(*See also* 3545, 3744a, d, e, f.)

3738. BLACKMAN, G. E.
Studies in the principles of phytotoxicity. I. The assessment of relative toxicity.
J. exp. Bot., 1952, **3**: 1-27, bibl. 34.
It is shown that the precise assessment of relative toxicity of herbicides must involve studies of the effects on whole plants and at cell level, and that a wider range of species and a number of techniques must be used.

3739. SIMON, E. W., ROBERTS, H. A., AND BLACKMAN, G. E.
Studies in the principles of phytotoxicity. III. The pH factor and the toxicity of 3:5-dinitro-o-cresol, a weak acid.
J. exp. Bot., 1952, **3**: 99-109, bibl. 16.
Experiments are described which show that when the tissues of *Lemna minor* or *Brassica alba* are in direct contact with a large volume of 3:5-dinitro-*o*-cresol the concentration of toxicant required to exert a given toxic effect increases substantially as the pH is raised. When solutions or suspensions of the toxicant are applied as sprays to seedlings of *B. alba*, however, the concentration needed to kill half the plants changes by a factor of less than 2 over the same pH range. The explanation given is that under the conditions of spraying the volume of spray droplets relative to that of plant tissue is small. "Thus the pH effect is masked since the buffering capacity of the cells exceeds that of the droplets, with the result that 3:5-dinitro-*o*-cresol largely acts upon the cells at a pH determined by the tissues, a pH which may bear little relation to that of the original solution. Supporting evidence is produced that the pH factor operates in the same way for other weak acids, such as the chlorophenoxyacetic acids."—University of Oxford.

3740. AUDUS, L. J.
The decomposition of 2:4-dichlorophenoxyacetic acid and 2-methyl-4-chlorophenoxyacetic acid in the soil.
J. Sci. Food Agric., 1952, **3**: 268-74, bibl. 8.
Three phases were distinguished in the disappearance of 2,4-D and MCPA from the soil: (1) an initial rapid adsorption on the soil colloids; (2) a lag phase during which no appreciable change in concentration of herbicide in the soil solution took place; (3) a phase of rapid disappearance, which was maintained indefinitely on subsequent perfusion with fresh herbicide solutions. These facts and results with a bacterial poison (sodium azide) suggest that the breakdown is due to a microorganism population proliferating in response to the perfusion. [From author's synopsis.]—Dep. Bot., Univ., London.

3741. MCCALL, G. L.
"CMU"; new herbicide.
Agric. Chemls, 1952, **7**: 5: 40-2, 127-8, illus.
CMU, which is 3-(p-chlorophenyl)-1,1-dimethylurea, has been shown in field and laboratory tests to be effective as a soil sterilant at rates of 20 lb. per acre and higher. It acts primarily through the root system and kills many grasses as well as broad-leaved weeds. It has shown promise as a pre-emergence herbicide in several crops, including sugar cane, pineapples, potatoes, asparagus and spinach, and as a directed post-emergence spray in certain of these crops. [A further note on this substance will be found in *Fert. Feed. St. J.*, 1952, 38: 10.]

3742. CUNNINGHAM, R. H.
A self-propelled herbicide sprayer for experimental plots.
Sci. Agric., 1952, **32**: 285-8, illus., being *Contr. Cereal Div., exp. Fms Serv., Ottawa* **164.**
A small self-propelled herbicide sprayer constructed

to meet the requirements of experimental plot work is described. The machine weighs 135 lb. and is easily operated by one man. Several acres a day can be covered. Spraying pressure holds constant and coverage is uniform. It is easily transported in a small trailer. It will travel between rows or on pathways, eliminating damage to plants. [Author's summary.]

3743. KNUST, H. G.
Farm made boom sprays in southern Queensland.
BATES, G.
Some notes on home-made boom sprays in north Queensland.
Cane Grs' quart. Bull., 1952, **15**: 80-3, illus., and 83-8, illus.
Descriptions with illustrations are given of 6 outfits used for spraying from 1 up to 6 interrows of sugar cane at rates of 10 to 40 gal per acre. Some include accessory attachments for hand spraying headlands and an upright extension used for the same purpose or for spraying fence lines.

Noted.

3744.

a BROWN, R., AND OTHERS.
The *Striga* germination factor. 2. Chromatographic purification of crude concentrates.
Biochem. J., 1952, **50**: 596-600, bibl. 5.

b CRÊTE, R.
Les herbicides en culture potagère. **(Herbicides in vegetable gardening.)**
Rev. d'Oka, 1952, **36**: 55-63.

c DENISEN, E. L.
Weed control in strawberries.
Wis. Hort., 1952, **42**: 186.
With Crag Herbicide 1 (sodium 2,4-dichlorophenoxy ethyl sulphate).

d ESCRITT, J. R.
Selective weedkillers.
J. Sports Turf Res. Inst.,* 1951, **8**: 80-3.
MCPA and 2,4-D.

e JENSEN, H. L., AND PETERSEN, H. I.
Detoxication of hormone herbicides by soil bacteria.
Nature, 1952, **170**: 39-40, bibl. 3.
MCPA and DCPA (2,4-D).

f MOORE, T.
A home made selective weedkiller sprayer.
J. Sports Turf Res. Inst.,* 1951, **8**: 84-6, illus.

g RYKER, T. C.
Weed eradication in cane fields in Louisiana.
Proc. 24th annu. Conf. Asoc. Téc. Azuc. Cuba, 1950, pp. 215-18.
With TCA and 2,4-D.

h SELLERS, W. F.
The collection of the cactus weevil, *Cactophagus spinolae* (Gylh.), in Mexico and its despatch to South Africa.
Bull. ent. Res., 1952, **43**: 43-50, illus.
For prickly pear control.

i SMITH, O., ORSENIGO, J. R., AND GERTSCH, M. E.
Chemical weed control in coffee. [Spanish summary 9 lines.]
Turrialba, 1951, **1**: 280-3.
For abstract see *H.A.*, 21: 1599.

j U.S. DEPARTMENT OF AGRICULTURE, DIVISION OF WEED INVESTIGATIONS.
Bibliography of weed investigations for April–June and July–September 1951.
[*Publs.*] *U.S. Dep. Agric.*, 1951, pp. 52, and 34 respectively.
For the first publication of this series see *H.A.*, 21: 3495.

* Formerly *J. Bd Greenkeep. Res.*

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 3256, 3259, 3262, 3325-3329, 3332, 3342, 3343, 3346, 4514, 4528, 4529, 4531, 4532, 4537, 4539, 4544, 4545, 4547, 4561, 4562.)

3745. NATIONAL INSTITUTE OF AGRICULTURAL BOTANY.
Guide to varieties of field and vegetable crops under trial, observation and propagation 1952.
[*Publ.*] *N.I.A.B. Cambridge*, 1952, pp. 68.
Varieties of the following vegetables are under trial at the Headquarters Trial Ground, Cambridge, and/or at 11 regional trial stations of the N.I.A.B.: bean, beetroot, broccoli, brussels sprouts, cabbage, carrot, cauliflower, onion, pea, poppy, potato, radish and sunflower.

3746. STRYDOM, E.
The growth of our vegetable industry.
Fmg S. Afr., 1952, **27**: 93-8, bibl. 4.
A historical account is given of the development of the South African vegetable industry since van Riebeeck landed 300 years ago. Expansion has been particularly marked since 1938, and the main problem today is the establishment of a more effective distributing and marketing system.

3747. BOYES, D.
Plant breeding report.
A.R. nat. Veg. Res. Stat. Wellesbourne for 1951, 1952, pp. 8-9.
The production of nucleus stock seed of selected varieties of brussels sprouts, winter cauliflower, cabbage and onion is reported and the future programme is briefly outlined.

3748. H., F. R.
Notes on new vegetable varieties.
Grower, 1952, **37**: 1453-7.
Brief notes are given on promising new Seale-Hayne and Cambridge varieties of broccoli and Cambridge varieties of brussels sprouts, cabbages and cauliflowers, as well as several new beans, peas and lettuces being grown in Britain.

3749. LAMM, R., TOMETORP, G., AND ÅVALL, H.
Klassificerande sort- och stamförsök med köksväxter 1949-1951. **(Vegetable variety trials 1949-1951.)** [English summary 2½ pp.]
Medd. Trädgårdsförs. Malmö **73**, 1952, pp. 30, bibl. 18.

A further report on new vegetable varieties and strains tested mainly at Alnarp and adjudged " first-class elite " and " first-class ".

3750. THOMAS, N. F.
Pruebas de variedades de hortalizas en los trópicos. **(Vegetable variety trials in the tropics.)** [English abstract 18 lines.]
Turrialba, 1952, **2**: 12-15, bibl. 6.

Trials are reported of local and imported vegetable varieties carried out at Turrialba and Cartago, Costa Rica, by the Interamerican Institute of Agricultural Sciences. Varieties which yielded best in Turrialba included strains of Great Lakes and Imperial head lettuce; Black-seeded Simpson and Slobolt loose-leaf lettuce; Louisiana Red Creole bulbing onion; Nebuka bunching onion; IAIAS breeding lines of tomato; Jamaica (local) and Tendergreen snap beans; IAIAS Line A-65 sweet pepper; Rosita eggplant; Red Giant radish; Evergreen, Emerald and Larga (local) okra; Purple Top White Globe turnip; Italian Green Sprouting broccoli; Stein's Early Flat Dutch cabbage; Chihli Chinese Cabbage; Golden Plume celery; Fordhook Giant Swiss Chard; and Detroit Dark Red beet. All sweet potato varieties gave satisfactory results but none of the watermelon or cauliflower varieties tested yielded well. Varieties which yielded best in Cartago included White Boston, Great Lakes and Imperial head lettuce; Red-cored Chantenay carrot; Louisiana Red Creole bulbing onion; Nebuka bunching onion; Jamaica and Tendergreen snap beans; Red Giant radish; Stein's Early Flat Dutch cabbage; Golden Plume celery; and Fordhook Giant Swiss chard.

3751. COLEMAN, F. B., AND PEEL, A. C.
Storage of seeds.
Qd agric. J., 1952, **74**: 265-76.

Losses are encountered in storing vegetable seeds in tropical and sub-tropical countries through a decline in their viability. In North Queensland, under present storage practices, certain seeds lose their viability in a few weeks. Trials to overcome this difficulty were made at four centres with seed of cucumber, carrot, lettuce, cabbage and beet. It was found that the ideal storage conditions are those of dry refrigeration; where this is not available the next best is normally dry, cool storage. The moist conditions in florists' shops, in tropical areas, or even in a moist refrigerator are most unsuitable. Storage in airtight tins was most satisfactory under all conditions.

3752. JONAS, H.
Some effects of radio frequency irradiations on small oil-bearing seeds.
Physiol. Plant., 1952, **5**: 41-51, bibl. 23, illus.

Seeds of carrots, onions, beets, lettuce, and tomatoes have been irradiated with high powered radio waves of 43 to 44 Mc/s. This caused an increased rate of germination which was dependent on the voltage gradient, power and energy input, and temperature of the seed. Infra-red irradiation produced smaller increases of the germination rate. This was paralleled by an approximate halving of total reducing sugars after invertase action on seed extracts. Ketose sugars, in contrast, doubled simultaneously during an energy input of at least 12·5 calories per millilitre of seed. [Author's summary.]—University of California, Berkeley.

3753. WOODMAN, R. M.
Rotation of vegetables with different manurial treatments.
A.R. nat. Veg. Res. Stat. Wellesbourne for 1951, 1952, pp. 52-60, bibl. 2.

1. Details are given of the treatments and layout of a sixteen-year manurial experiment on a rotation of vegetables [covering 4 complete rotations]. 2. Difficulties in the interpretation of the yield response to any given treatment over the period of the experiment are briefly discussed. 3. Brussels sprouts, in general, showed generally declining yields for all treatments over the period. The decline was very similar for the treatments NPK.D, NP.D, NK.D, PK.D, D, NPK, NK, and PK [D denoting dung]. Of this group, NPK.D gave yields a little higher, and NK and PK a little lower than the others. The NP and Nil yields were generally distinctly lower than the remainder. 4. Yields of peas on the whole were stable over the four rotations, except that yields from the Nil and NP plots fell off after four years. NPK.D gave the highest mean yield over the sixteen years. 5. NPK.D gave the best yield for summer lettuce, and yields from this plot showed an increase over the period of the experiment. PK gave approximately constant yields throughout the four rotations. Nil and NP yields fell after the sixth year to nearly zero. The remaining treatments gave yields between the NPK.D and PK yields. 6. Yields of spring cabbage for NK and D, though varying considerably from year to year, showed no trend during the experiment. NP, PK, and Nil gave yields which declined to zero by the end of the experiment, the decline beginning earlier with the Nil treatment. NPK.D yields showed a general increase as the experiment progressed, as also did the remaining treatments, but to a lesser extent. 7. Carrot yields since 1944 decreased with all treatments and most with NP and Nil. [Author's summary.]

3754. SAYRE, C. B., AND VITTUM, M. T.
Effect of different sources of fertilizer nutrients and different rates of fertilizer applications on yields of vegetable canning crops: beets, cabbage, peas, sweet corn, tomatoes.
Bull. N.Y. St. agric. Exp. Stat. **749**, 1952, pp. 30, bibl. 28.

Statistical analyses of the yield records from a 6-year experiment show that there were significant differences due to rates of application, but there were no significant differences in yields of any of the crops due to differences in fertilizer formulae. The following treatments produced significant increases in yields of individual crops: in beets and cabbage up to 1,200 lb. per acre of 5–10–10 fertilizer, or 750 lb. of 8–16–16 fertilizer; in peas and sweet corn up to 600 lb. of 5–10–10, or 375 lb. of 8–16–16; and in tomatoes 1,500 lb. of 4–12–8, or 1,000 lb. of 6–18–12.

3755. Hewitt, E. J., and Bolle-Jones, E. W.
Investigations on possible micronutrient elements for higher plants. I. Experiments with cobalt, nickel and gallium in sand culture.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 62-6, bibl. 14.

Tomato, lettuce and sugar beet plants were grown in sand culture to which Ga, Co and Ni were added as supplements to the nutrient solution. With tomatoes and sugar beet the addition of all 3 elements generally reduced vigour and produced certain symptoms that were more marked than when any one of the elements was omitted. Lettuce showed tip-burn but no treatment differences. The trials produced no evidence that these elements were essential, but it would be premature to draw definite conclusions on this point.

3756. Hewitt, E. J.
Molybdenum as a plant nutrient. III. The effects of molybdenum deficiency on potato, carrot, radish and some other crops.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 54-7, bibl. 8, illus.

Sand culture trials have shown that at least 2 years' growth under deficiency conditions may be needed before potatoes show a visual response to Mo deficiency. The symptoms observed are described. Seven crop plants were used in trials which showed that demineralized rainwater is satisfactory for use in large scale work on Mo deficiency, its possible Mo content being little in excess of that of glass-distilled water. Among these plants carrot and radish were tested for the first time and the deficiency symptoms obtained are described. Swede, but not radish, plants developed whiptail effects similar to those shown by cauliflower when grown at low but still appreciable levels of Mo.

3757. Springer, U., and Steigerwald, E.
Neuere Untersuchungen über Müll und seine Verwendungsmöglichkeit in Gartenbau und Landwirtschaft. **(Recent investigations concerning town refuse and the possibility of its use in horticulture and agriculture.**
Z. PflBau. PflSchutz., 1951, **2**: 241-70, from abstr. in *Soils and Ferts*, 1952, **15**, No. 1083.

The composition of various forms of Munich town refuse is described. Field and pot experiments showed that refuse increased the yields of certain crops, e.g. spinach, provided that it was mixed well with the soil and that the soil moisture was sufficiently high. The refuse was most effective when applied in the autumn. Yields of crops intolerant to fresh refuse, e.g. carrots, were increased by composted refuse. Simultaneous application of physiologically acid fertilizers with alkaline refuse was advantageous, particularly on calcareous soils. The P_2O_5 in fresh refuse was only slightly available to plants. The substances in refuse harmful to some plants occurred mainly in the ash. Fresh refuse was a satisfactory substitute for horse manure in hotbeds.

3758. Martin, W. P., and others.
Soil and crop responses from field applications of soil conditioners.
Soil Sci., 1952, **73**: 455-71, bibl. 14, illus., being *J. Art. Ohio agric. Exp. Stat.* **29-52.**

Several Krilium soil conditioners (synthetic polyelectrolytes) were worked into 4 heavy soils at rates varying from 0·02 to 0·2%. Structural improvement occurred in all cases and persisted through the second growing season. Sweet corn, oats, beetroot and carrots responded with appreciable yield increases, but responses by potatoes and sugar beet were negligible. No toxicities were noted.

3759. Grainger, J.
Damage to glasshouse crops by over-manuring.
J. Sci. Food. Agric., 1952, **3**: 164-72, bibl. 11, illus.

Severe damage to lettuce involving tip-burn of the leaves, wilting and death has occurred in several tomato glasshouses in west Scotland. Soils from such houses lose their capacity to cause damage if their soluble-salt content is reduced by leaching or liming. The damage was produced experimentally when mixed artificial fertilizer was added to normal soil in amounts equivalent to four tons and more per acre. It is therefore concluded that the diseased condition results from over-manuring, i.e. too high a content of soluble salts in the soil. Heavy manuring of the preceding tomato crop may contribute to this over-manuring of the lettuce. Only one extreme case of actual damage to a tomato crop has been reported but the yield of tomatoes begins to fall at higher levels of soluble mineral matter than for lettuce. It is suggested that the yield of tomatoes begins to fall at lower values of soluble-salt content when added manures are grossly unbalanced than when they are attuned to the needs of the crop. [Author's synopsis.] [See also *H.A.*, 20: 2721.]—West of Scotland Agricultural College, Auchincruive.

3760. Kilbinger, A.
Die Düngung mit Kohlensäure. **(Carbon dioxide as a fertilizer.)**
Technik Bauern u. Gärtner, Edition G, 10 Oct. 1951, p. 542, from abstr. in *Agric. Hort. Engng Abstr.*, 1951, **2**, No. 1053.

Carbon dioxide has great potentialities as a gaseous fertilizer for use in glasshouses. It was found that as the result of an application of carbon dioxide yields of glasshouse crops, especially of cucumbers, increased three to four times and the crops reached the flowering stage and maturity earlier. The effect of CO_2 on simpler organisms, e.g. green aquatic algae (*Chlorella vulgaris*), was even more marked, a fifteen-fold increase in organic matter being recorded in some cases.

3761. Cortvriendt, S. F., and De Groote, R.
L'humidification artificielle de l'air dans les serres. Un problème difficile mais qu'il n'est pas impossible de résoudre. **(The artificial humidification of the air in glasshouses. A difficult but not insoluble problem.)**
[English and German summaries 7 lines each.]
Rev. Agric. Brux., 1952, **5**: 206-10.

In a trial at Ghent in 1951 with a Swiss electric humidifier, in which a jet of water is projected against a fan which spreads it as a fine mist, a constant humidity was successfully maintained for some months.

3762. Leben, C., and Keitt, G. W.
Studies on helixin in relation to plant disease control.
Phytopathology, 1952, **42**: 168-70, bibl. 8.
A partly purified preparation of helixin, an antifungal antibiotic was tested in the greenhouse for its protective action by means of the tomato early blight (*Alternaria solani*) technique. The LD50 and LD95 values were found to be 6·5 and 37·9 μg. per ml., respectively. The antibiotic was less toxic at pH 3·0 and 4·7 than under more alkaline conditions. It was toxic to tomato plants when applied to the roots at 180 μg. per ml., and phytotoxic to tomato and cowpea cuttings when absorbed at concentrations of 7·5–15 μg. per ml. and more, but no deleterious effects were noted when 3 mg. per ml. was applied as a spray to the foliage of several species of plants.

3763. Ministerie van Landbouw, Nederland (Schipstra, K.).
Bestrijding van plantenziekten, schadelijke dieren en onkruiden in de landbouw. (Receptenboek.) **(Control of plant diseases, pests and weeds in agriculture. (Book of formulae.)**
Meded. PlZiekt. Dienst. **116**, 2nd edition, 1952, pp. 121, Fl. 1.45.
Very concise information is given on the materials and amounts required for controlling the various pests, diseases and disorders of agricultural and horticultural field crops, and on the various chemicals and devices used in plant protection, including weed, rodent, bird and wild animal control. There is also a list of addresses, mainly in Holland, of manufacturers, dealers and importers of plant protective materials.

3764. Yarwood, C. E.
The phosphate effect in plant virus inoculations.
Phytopathology, 1952, **42**: 137-43, bibl. 16, illus.
Solutions of K_2HPO_4 were injurious to bean leaves, and the injury increased with increasing time of exposure and increasing concentration of phosphate. The addition of 1% K_2HPO_4 in the inocula of a number of plant viruses increased the number of lesions formed on inoculated bean leaves. On other hosts the effect of the phosphate was much less than on bean. The optimum phosphate concentration for inoculations of tobacco mosaic virus, tobacco necrosis virus, alfalfa mosaic virus, and white clover mosaic virus on bean leaves was about 1%.—Univ. Calif.

3765. Joseph, T. C.
Fungi inhibiting growth of the crown-rot disease fungus *Sclerotium delphinii* Welch.
Nature, 1952, **169**: 1016-17, bibl. 2.
Three soil fungi, two of them species of *Penicillium* and the third apparently belonging to the Fungi Imperfecti were found to inhibit the growth of *Sclerotium delphinii* in agar cultures. So far, chemicals have failed to control this destructive pathogen of numerous vegetables and ornamentals and it is hoped that a method of biological control may be found. Preliminary experiments are being carried out with *Penicillium* filtrates on two susceptible hosts.—Fordham Univ., N. York and N. York Bot. Gardens.

3766. Biron, R. A.
Progress report on soil fumigation.
Down to Earth, 1951, **7**: 2: 5-8, bibl. 15, illus.
In this review of tests with preparations containing ethylene bromide satisfactory results are reported for tobacco, carrots, celery, cotton, lima beans, sweet potatoes, sugar beet, and tomatoes. Recommendations to ensure success from the treatment are outlined. —The Dow Chemical Co., Midland, Michigan.

3767. Gill, D. L.
Effect of tung-nut meal and parathion on root-knot nematode infection.
Plant Dis. Reptr, 1952, **36**: 18-21, bibl. 6, illus.
In experiments carried out in cans of sandy soil using tomato seedlings, gardenia cuttings and squash seeds, the results showed that tung-nut meal is of no value as a soil treatment for the control of root-knot nematodes (*Meloidogyne* spp.). The benefit some growers have reported is probably due to the fertilizing effects of the meal. Parathion thoroughly mixed in the soil exerted considerable control, but its practical use in the field at this stage is questionable; its effects upon other plants is unknown and it should not be used in soil growing food plants.—U.S. Dep. Agric., Tifton, Georgia.

3768. Ciccarone, A.
Resultati di fumigazione nematocida in terreno ricco di organi vegetali carnosi, vivi e presentanti galle non decadute di *Heterodera marioni* (Cornu) Goodey. **(Results of fumigating eelworms in soil containing fleshy roots.)** [English summary ½ p.]
Boll. Staz. Pat. veg. Roma, 1950 (issued 1952), **8**: 181-6, bibl. 3.
A deep, sandy soil near Rome, in which carrots heavily infested with eelworm (*Heterodera marioni*) had been growing during the winter, was fumigated with DD immediately after the spring ploughing, when live roots and whole plants were still in the soil. The fumigation was carried out in two ways: " total " and " in the row ", with a hand injector gun. In the " total " fumigation the holes were 17 cm. deep, 30×30 cm. apart, and the dosage 3 c.c. per hole. The soil was dug a few days later and afterwards planted with San Marzano tomatoes. The method gave satisfactory results in controlling the eelworms, and in the regular ripening and the yield of the crop. The " in the row " treatment, with injections 17 cm. deep at 30 cm. apart, was not satisfactory.

3769. Gould, G. E.
Insect pests of muck crops.
Stat. Circ. Ind. agric. Exp. Stat. **338**, 1949, pp. 20, illus. [received 1952].
A descriptive leaflet on the main insect pests of potatoes, maize, mint, onion, brassicas, celery and cucurbits with recommendations for their control.

3770. Wolcott, G. N.
Control of the soil-inhabiting grubs of Puerto Rico.
J. Agric. Univ. Puerto Rico, 1950, **34**: 333-7, bibl. 2.
The roots of various crops in Puerto Rico are liable to

serious damage by the grubs of the May beetles *Phyllophaga portoricensis* and *P. vandinei* and of the striped weevil *Diaprepes abbreviata*. In laboratory experiments lindane (the gamma isomer of benzene hexachloride) was almost as effective as aldrin in killing third instar *Phyllophaga* grubs, applications of either at the rate of 2 lb. per acre resulting in commercial control, but was much inferior in killing newly hatched *Diaprepes* grubs, merely delaying their development when applied at 10 lb. per acre. Aldrin, at the rate of 0·5 lb. per acre, in all tests killed all *Diaprepes* grubs.

771. HAHMANN, K., AND MÜLLER, H. W. K.
Zur Bekämpfung des getüpfelten Tausendfusses. (The control of the spotted millepede.)
NachrBl. dtsch. PflSchDienst., Braunschweig, 1952, **4**: 22-4, bibl. 8, illus.

Reference is made to the damage caused by millepedes to cultivated crops with particular reference to the infestation of cucumber plants by the spotted millepede, *Blanjulus gluttulatus*, and experiments on the control of this pest are described. Satisfactory results were obtained with rather high concentrations of gamma-hexa-emulsions (e.g. the spray-hexacid "G" at 3% at the rate of 5 l. per sq. m.).—Staatinstitut für Angewandte Botanik, Hamburg.

3772. FRÖMMING, E.
Neuere Erkenntnisse über unsere Nacktschnecken als Schädlinge. (Recent observations on slugs as garden pests.)
Angew. Bot., 1952, **26**: 94-9, bibl. 21.

In order to emphasize the importance of slugs as garden pests the author adds the present review to his 17 earlier publications on various aspects of the problem. The figures given, for instance, for *Arion empiricorum* show that a single slug devours 350 g. of plant substance from May to October, but the indirect damage caused by the rotting of gnawed garden produce is assessed as 10-30 times higher. In the author's view metaldehyde is overrated as a slug bait, or at least the conditions under which the chemical acts in the garden have been insufficiently explored.

3773. ANON.
The Esher vegetable washing machine.
Roadless News, 1951, **15**: 74, illus.

Details are given of this new conveyor-type vegetable washer which is said to have given highly satisfactory results with beetroot, parsnips, leeks, carrots (bunched and topped), bunched onions, radishes, artichokes and turnips.

3774. SINGH, K. K., KAPUR, N. S., AND MATHUR, P. B.
Studies in cold storage of beet roots, cabbages, cauliflowers and sweet potatoes.
Indian J. Hort., 1952, **9**: 1: 1-12, bibl. 19, illus.

From the results of trials at the Central Food Technological Research Institute, Mysore, it is recommended that beetroot, cabbage and cauliflower be stored at 32°-35° F. at relative humidities of 85-87·5%; under these conditions the approximate storage lives were 56, 84 and 56 days respectively. For sweet potatoes a temperature above 50° F. was necessary and the optimum humidity and storage life remain to be determined. Percentage weight losses were recorded at fortnightly intervals for each vegetable held at 32°-35° F. and at one or two higher temperature ranges.

3775. SMITH, W. H.
The commercial storage of vegetables. Part I. General. Part II. Broccoli and cauliflowers. Part III. Carrots (main crop).
Food Invest. Leafl. D.S.I.R. Lond. **15**, 1952, pp. 7, bibl. 6, 6d.

The information given here on the long term refrigerated storage of cauliflowers and the farm and refrigerated storage of carrots is based on the results of experiments published elsewhere.

3776. CRANG, A., AND STURDY, M.
A comparison of some varieties of vegetables preserved by bottling, canning and freezing. Progress report I.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 199-206, bibl. 3.

Tests were made on asparagus, mushrooms, 4 varieties of broad bean, 2 varieties of dwarf and runner bean, and 5 varieties of pea. Preservation by freezing was judged to be greatly superior to bottling or canning for all types except mushrooms. The varieties that proved best for freezing were not necessarily the best for heat-preservation.

3777. SMITH, W. H.
Factors in distribution affecting the quality and nutritional value of foodstuffs. Loss of quality in fresh fruits and vegetables during distribution.
Chem. Ind. Lond., 1952, No. 1, pp. 8-10.

Some of the variable factors which affect the quality of vegetables during distribution are discussed. As an example of methods of assessing quality a scoring system adopted for lettuces is tabulated. Using this scoring system it is possible to illustrate graphically the relationships between yellowing, disease development, bolting and wilting, and accumulated temperature (days × degrees above 30° F.). Changes in air shade temperatures and product temperatures in cool weather consignments of Cornish broccoli, lettuce and plums railed to London are also tabulated; generally air temperatures were lower at destination than at loading point and self-heating was observed in only one instance. Little change in quality of broccoli was observed during these stages and it is concluded that most of the visible deterioration takes place after the broccoli enters the retail shop. Finally, the effects of treatment in retail shops is illustrated by a comparison between lettuces kept in their crates and re-arranged in trays at relative humidities of 70% and 90%.—D.S.I.R., Ditton Lab. [See also *H.A.*, 22: 2217.]

3778. ANALYTICAL METHODS COMMITTEE.
The determination of carotene in green-leaf material. Part II. Green-leaf materials other than grass.
GRIDGEMAN, N. T.
Supplementary bibliography on carotene estimation with special reference to green-leaf material.
Analyst, 1952, **77**: 171-2, and 173, bibl. 12.

A table is included listing the carotene contents of brussels sprouts, cabbage, carrot leaf, chive, leek,

parsley, sage, watercress and several other plants. The original bibliography on carotene estimation was noted in *H.A.*, 21: 2283j.

Brassicas.

(*See also* 3935 l, m.)

3779. FINCH, C. G.
Variety trials of early cauliflowers, 1947 to 1950.
J. nat. Inst. agric. Bot., 1950, **5**: 438-45.
Variety trials of early cauliflowers were conducted by the National Institute of Agricultural Botany from 1947 to 1950 at a number of centres near important early cauliflower growing districts to compare the relative merits of the Cambridge varieties bred by the Horticultural Research Station and some widely grown commercial strains. The trials were all laid out as randomized blocks having six replications, each block consisting of 60 effective plants. Varieties used in 6 or more trials were: Early Snowball (control), Cambridge 5, 6 and 7, Progress 110, Pioneer, White King and Early London. The merits of each are assessed. The following varieties appeared to have particular merits in 3 maturity groups. *Period 1:* Cambridge 5 was the earliest variety to mature but its weight and quality were not equal to some of the later ones. *Period 2:* Early Snowball, on the average, gave the best quality and highest yield of varieties maturing about a week later than Cambridge 5. *Period 3:* Pioneer and 110 gave the best results in the group maturing about a week later than Early Snowball. Pioneer gave a denser curd than 110 but matured some 2 days later.

3780. MÜLLER, W.
Der Einfluss von Licht, Temperatur und Substrat auf die Keimung von Samen einiger *Brassica*-Arten. **(The influence of light, temperature and medium on seed germination in some *Brassica* spp.)**
Angew. Bot., 1952, **26**: 100-10, bibl. 9.
The results obtained with *Brassica campestris* var. *oleifera*, *B. napus* and *B. nigra* are illustrated by graphs. The experiments were carried out in 1932.

3781. JAGENDORF, A. T., BONNER, D. M., AND NAYLOR, A. W.
An atypical growth of cabbage-seedling roots. I. Morphology, histology, and induction conditions.
Bot. Gaz., 1952, **113**: 334-47, bibl. 53, illus.
Atypical growths on the roots of cabbage seedlings were induced by parachlorophenoxyacetic acid. Various nitrogenous compounds, mainly of the amino and amide groups, were found to augment the growths, while buffering the medium at pH 6·0 or above inhibited them. The tumours consisted of fasciated plates of lateral root tissue and arose from the pericycle, alone or combined with the endodermis, of the primary root.—Yale Univ.

3782. PARKINSON, A. H.
Experiments on vegetative and reproductive growth of cauliflower.
A.R. nat. Veg. Res. Stat. Wellesbourne for 1951, 1952, pp. 38-51, bibl. 10.
Of the factors influencing vegetative and reproductive growth of cauliflowers studied, day length was shown to have a minor effect on the time taken to produce curds. Small but significant differences in date of harvest and size of curd were obtained by varying the pretransplantation treatment. Low temperature treatment of young plants hastened maturation. Rich compost in small pots and poor compost in large pots gave small curd size and delayed cutting date. The possible application of some of these results to plant breeding is discussed.

3783. WINTER, E. J.
The effects of certain adverse conditions on growth and late development of cauliflower and lettuce.
A.R. nat. Veg. Res. Stat. Wellesbourne for 1951, 1952, pp. 31-7, bibl. 5.
In cauliflowers grown in sand culture in different pot sizes, growth rate and final size increased with increasing pot size. In field grown lettuce hearting and bolting were delayed in the proportion to closeness of spacing and severity of transplanting treatment. Transplanting reduced the number of lettuce reaching marketable size, and no marketable heads at all were obtained at 6 in. spacing. It is suggested that reduction in growth rate can delay the later stages of development and flowering in both cauliflower and lettuce irrespective of the size of the plant.

3784. PAISLEY, K.
Fertilizers for horticultural crops. 5. Manures for brussels sprouts.
Fert. Feed. St. J., 1952, **38**: 111.
Sprouts need manures that break down slowly. Generous manuring is required but excess of N causes " blown " sprouts. On light land 15-20 tons F.Y.M. per acre should be applied in autumn and supplemented before planting with 2 cwt. of sulphate of ammonia, 5 cwt. of superphosphate and 1-2 cwt. of sulphate of potash per acre. Well grazed ley land required no F.Y.M. but only 5-6 cwt of hoof-and-horn meal, 4 cwt. superphosphate and 2 cwt. sulphate of potash per acre. Heavy land to which manure was applied for the previous crop requires a compound fertilizer with an analysis of 5% N, 10% P_2O_5 and 6% K_2O at 8-10 cwt. per acre. Soil acidity should be corrected by applying lime. When the plants are well established and have stout stems, a top dressing of 1 cwt. Chilean potash nitrate per acre is beneficial. If stimulation appears necessary a further top dressing of a quick-acting N fertilizer can be given.

3785. PAISLEY, K.
Fertilizers for horticultural crops. 3. Manures for cabbages.
Fert. Feed. St. J., 1952, **38**: 13, 15.
Recommendations are given for seedbed treatment, manuring before planting, and for spring, summer and winter cabbages.

3786. PAISLEY, K.
Fertilizers for horticultural crops. 4. Manuring summer and autumn cauliflower.
Fert. Feed. St. J., 1952, **38**: 87-8.
Detailed advice is given on the use of dung and minerals for summer, autumn and winter cauliflowers. If liming does not correct whiptail in summer cauliflower, 2-4 lb. K molybdate per acre should be applied.

3787. Vittum, M. T., and Hervey, G. E. R.
Relation of Marion Market cabbage yield and bursting to rates of application and sources of fertilizer nutrients and insect control.
Bull. N.Y. St. agric. Exp. Stat. **750**, 1952, pp. 16, illus.
Results from 4-years' trials with Marion Market cabbage indicate that increasing the rate of fertilizer application increased the marketable yield and the amount of bursting; that insect control with DDT, BHC or lindane increased the yield and decreased bursting; and that the different sources or carriers of N, P and K had no effect on either yield or bursting. [From authors' abstract.]

3788. Agarwala, S. C.
Relation of nitrogen supply to the molybdenum requirement of cauliflower grown in sand culture.
Nature, 1952, **169**: 1099, bibl. 10.
Cauliflowers were grown in sand culture with Mo at deficiency, normal and excess levels and N supplied in 7 different forms. The source of N interacted with Mo at deficiency levels and also modified the effects of excess Mo. A full account of this work will be presented elsewhere.—Long Ashton Res. Stat. [See next two abstracts.]

3789. Agarwala, S. C., and Williams, A. H.
The effects of inter-relationships between molybdenum and nitrogen supply on the free amino-acid status of cauliflower plants grown in sand culture.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 66-70, bibl. 6.
Depression of glutamic acid at the deficiency level of molybdenum was found to be independent of nitrogen source. Supply of citric acid with nitrate reversed this effect. Arginine became an important amino compound with ammonium and urea-N supply and this effect was pronounced at the deficiency level of molybdenum with these N-treatments where arginine generally became the principal amino compound. [Authors' summary.]

3790. Agarwala, S. C.
The effect of molybdenum and nitrate status on the carbohydrate and nitrogen metabolism of cauliflower plants in sand culture.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 70-7, bibl. 15.
Plants grown with eight levels of molybdenum [Mo] ranging from 0·000005 to 19·2 p.p.m. and with nitrate [N] supply of 6 and 24 mg. eq./l. were analysed for Mo, chlorophyll, sugars, nitrite, hydroxylamine, ammonia, N and organic nitrogen. The following conclusions are drawn from the data: (1) Mo accumulation was greatest in leaves and roots which are regarded as probable sites of N reduction in plants. (2) The concentration of Mo in plants supplied with 0·000005 to 0·0005 p.p.m. Mo showed little difference, although yield progressively increased at levels from 0·000005 p.p.m. to 19·2. (3) With a Mo supply of 0·48 p.p.m. or more, the high N plants accumulated more Mo than the low N plants. (4) Leaves showing " blue patches ", presumably an anthocyanin-Mo complex, showed great accumulation of Mo. (5) Lack of Mo depressed the chlorophyll content of mature leaves but not of young leaves. (6) The concentrations of various sugars found in cauliflower were depressed at the low levels of Mo and showed a minimum at 0·00005–0·0005 p.p.m. Mo, whereas chlorophyll content increased steadily from the lowest level of Mo—0·000005 p.p.m. Lack of chlorophyll alone would not, therefore, seem to account for the effect on sugar content and the demand for these for N assimilation might be partly responsible for the results obtained. (7) N accumulated at the deficiency level of Mo and decreased rapidly to 0·0005 p.p.m. Mo beyond which no consistent effects were noted. (8) Accumulation of N did not seem to be responsible for the symptoms characteristic of Mo deficiency as, during July and December with high N, there was as much residual N at 4·8 and 19·2 p.p.m. Mo, as with low N supply at 0·000005–0·00005 p.p.m. Mo, although there were no injurious effects in the former. (9) The concentration of organic nitrogen in leaves decreased at the deficiency levels of Mo. (10) The concentration of nitrite, hydroxylamine and ammonia did not bear any relation to Mo status. (11) The results indicate that the role of Mo may concern processes more fundamental than the reduction of N. [Author's summary.]

3791. McClean, A. P. D.
Cauliflower mosaic and cabbage black ringspot.
Fmg S. Afr., 1952, **27**: 251-3, illus.
These two virus diseases, which are probably mainly spread by the aphids *Myzus persicae* and *Brevicoryne brassicae*, are common in market gardens around Pretoria and Johannesburg. Mosaic is only known to attack crucifers, but cabbage black ringspot also occurs in various poppies, *Anchusa capensis* and endive. The symptoms of the diseases in these plants are described and illustrated. A fuller account is to be issued as a Science Bulletin.

3792. Stoll, K.
Die Kohlschwärze, Entstehung, Schadwirkung und Bekämpfung. **(The dark leaf spot disease of cabbage.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1952, **6**: 81-90, bibl. 22, illus.
The distribution and symptoms of the dark leaf spot disease of brassicas (*Alternaria* spp.) are described and the varieties affected in Germany are indicated. The effect of twelve proprietary spray materials on the disease is shown graphically, the best control being obtained with Kupperkalk-Nekal, and Polybar-Nekal.

3793. Bant, J. H., Beaumont, A., and Storey, I. F.
Hot-water treatment of broccoli seed.
N.A.A.S. Quart. Rev., 1950, **9**: 43-6, bibl. 2.
Losses of 50-80% of high quality broccoli have been experienced in some seasons in the Leeds-Wakefield area as the result of canker, *Phoma lingam*. Hot-water treatment of seed at 122° F. for 25 min. has proved 99% effective but reduces germination capacity by a varying degree depending on age and quality (by 17, 4, 10 and 6% for 1-year-old seed in 1946-49). The best time for treatment, which has no serious effect on keeping quality, is at harvest. Double treatment,

which is unnecessary but is sometimes given unwittingly, carries little risk.

3794. MACFARLANE, I.
Factors affecting the survival of *Plasmodiophora brassicae* Wor. in the soil and its assessment by a host test.
Ann. appl. Biol., 1952, **39**: 239-56, bibl. 16.

The prolonged persistence in the soil of *Plasmodiophora brassicae*, the cause of clubroot in crucifers, is one of the chief obstacles to its eradication. Investigations at Rothamsted Experimental Station showed that (1) with increasing time from inoculation there is a large and rapid fall in infectivity in the soil attributable to spontaneous germination of resting spores; and (2) infectivity thereafter appears to remain at a low but more or less steady level. It is presumably this residuum of resting spores which persists in the soil for long periods and is economically important in perpetuating the disease. Investigations on the effect on spore survival of varying environmental factors, and of possible means of stimulating germination showed that: germination of resting spores was more rapid in a wet, acid soil and could be delayed by alkaline or dry soil conditions or the presence of inhibitors; that there were fewer infections on test cabbage seedlings following catch crops of crucifers or ryegrass than after other non-crucifers; in fallow soil a similar reduction was, however, caused by adding nutrients alone. It was confirmed that *P. brassicae* can infect the root hairs of a number of non-crucifers and form zoosporangia and zoospores, but no other stages of the fungus have been seen in those plants.

3795. TSUYAMA, H., AND SAKAMOTO, M.
Studies on the soil-borne, phytopathogenic bacteria. Part I. A seasonal variation of the soft-rot-causing bacteria in the soil. [Japanese with English summary.]
Bull. Inst. agric. Res. Tohoku Univ., 1951, **3**: 13-22, from abstr. in *Rev. appl. Mycol.*, 1952, **31**: 175.

The seasonal trend in the number of bacteria causing soft rot of vegetables in the field was investigated on a farm at Tohoku, Japan, where potato and Chinese cabbage (*Brassica pekinensis*) had been raised alternately for many years. The number of bacteria was highest in June and then rapidly decreased. In late September, when the characteristic lesions began to appear on the basal leaves of Chinese cabbage, incidence suddenly increased and reached a new peak in January. A decline followed and persisted during March and April.

3796. COOK, A. A., LARSON, R. H., AND WALKER, J. C.
Relation of the black rot pathogen to cabbage seed.
Phytopathology, 1952, **42**: 316-19, bibl. 14, illus.

Black rot (*Xanthomonas campestris*) symptoms on cabbage develop not only on the leaves, but also on pods and seeds of seed-bearing plants. Details of seed infection are given. Opportunity for surface contamination of seeds occurs during the threshing process by bacteria released from infected pod walls and from infected aborted seeds. Such organisms probably yield to chemical as well as to hot water treatment. Germinable seeds only rarely yield viable black rot bacteria. Epidemics often arise from a very few initially infected seedlings in the seed bed in an environment favourable for secondary spread.—Univ. Wisconsin.

3797. EMPSON, D. W. (Compiler).
Survey of cabbage aphid populations on brussels sprouts, 1946-51.
Plant Path., 1952, **1**: 35-8, bibl. 1.

The survey is designed to provide information on the factors affecting the population level of the cabbage aphid, *Brevicoryne brassicae*, at any particular place and time with a view to a better understanding of the causes of pest outbreaks. Tentative conclusions are reached on regional distribution, year-to-year variation, overwintering and the influences of climate and weather.

3798. WENE, G. P., AND WHITE, A. N.
Toxicity of new insecticides to cabbage aphids.
J. econ. Ent., 1952, **45**: 118-20, bibl. 3, illus.

Of chemicals tested in Texas for the control of *Brevicoryne brassicae* on cabbage, TM2 (Systox) applied at the rate of 0·38 lb. per 100 gal. was effective for the longest period, i.e. 3 weeks.

3799. WRIGHT, D. W.
Contributions to the bionomics and control of the cabbage root fly (*Erioischia brassicae* Bché).
A.R. nat. Veg. Res. Stat. Wellesbourne for 1951, 1952, pp. 10-20, bibl. 4.

It is shown that the natural incidence of cabbage root fly attack, observed at Cambridge from 1939-51, varied considerably from year to year, due probably to biological factors such as predators and parasites, and does not appear to be correlated with the amount of rainfall in May and June. Dusts of low gamma BHC or 5% chlordane applied round the stem of transplants gave good control and were more effective than similar treatments made with 4% calomel dust. High rates of γ-BHC broadcast before transplanting were comparatively ineffective. Liquid formulations of γ-BHC, chlordane and parathion, applied to the base of the plant, were also highly effective and certain advantages of liquid over dust treatment are pointed out.

3800. BÖTTCHER, H.
Bekämpfung von Kohlfliege und Drehherzmade mit modernen Insektengiften. **(Control of the cabbage fly and the swede midge with modern insecticides.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1952, **6**: 92-3, bibl. 4.

In experiments for the control of cabbage fly (*Chortophila brassicae*) and the swede midge (*Contarinia nasturtii*), on brassica varieties, the best results were obtained with Hexitan (HCCH).

3801. ANON.
La lutte moderne contre la mouche du chou. **(Control of cabbage fly.)**
Gartenwelt, 1952, No. 4, pp. 67-8, from abstr. in *Rev. Agric. Brux.*, 1952, **5**: 612.

In experiments in Western Germany with early cauliflowers E605 and Streunex gave good results. When

1-2 kg. of the powder was mixed with 1 cu.m. of the potting soil 98-99% of the plants were healthy as compared with 11% in the controls. Spraying with a hexa compound after potting at the rate of 10 l. per 5,000 plants is a satisfactory alternative except for autumn potting. For sowing *in situ* 2 kg. of a hexa powder mixed with 10 cu.m. of surface soil was effective.

3802. Schmidt, H.
Über die Wirkung einer Beimischung von Hexa-Stäubemitteln zur Anzuchterde bei Blumenkohlpflanzen zur Bekämpfung der Kohlfliege. **(The effect of mixing hexa-preparations with the potting soil for the control of cabbage fly in cauliflowers.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1952, **6**: 8-10, bibl. 5.

In trials in Eastern Germany Arbitex added to the potting soil at the rate of 2-4 kg. per m^3 gave effective control of cabbage flies and improved yields without affecting the flavour of cauliflowers. Similar applications of Wofatox were unsuccessful.

3803. Hahmann, K., and Müller, H. W. K.
Zur Dauerwirkung der Kontaktinsektizide bei Kohlfliegenbekämpfung. **(The persistence of contact insecticides against the cabbage root fly.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1952, **4**: 51-5, bibl. 13, illus.

For the control of the cabbage root fly, *Chortophila brassicae*, the hexa-preparations are replacing the Hg-, DDT-, and E-preparations as having a more lasting effect, one application being generally considered sufficient. It was found, however, that, for mid-June plantings of cauliflower, two applications were necessary, the first just after planting, and the second at the beginning of July.—Staatinstitut für Angewandte Botanik, Hamburg.

3804. Harcourt, D. G., and others.
Tests of various insecticides against the cabbage maggot attacking radish, 1948-1950.
Sci. Agric., 1952, **32**: 214-18, bibl. 4, being *Contr. Div. Ent., Sci. Serv. Dep. Agric., Ottawa* **2875**.

Of the 15 chemicals tested as drenches or dusts for the control of cabbage root maggot, *Hylemyia brassicae*, with radish as test plant, the best 9 treatments were effective in the following order, giving 83 to 66% control; BHC, heptachlor, dieldrin, lindane and parathion, all as wettable powders, BHC dust, chlordane and aldrin wettable powders, and parathion dust. Both BHC wettable powder and dust were, however, found phytotoxic, and BHC and to a lesser degree lindane tainted the radishes.

3805. Kasting, R., and Harcourt, D. G.
Parathion residues of cauliflower heads after spraying.
Sci. Agric., 1952, **32**: 299-303, bibl. 5.

Trials to assess the extent to which cauliflower heads may be contaminated with parathion if sprays are applied later than the recommended period suggested that there is no danger if the insecticide is applied at the rate recommended for other vegetables. Heads sprayed up to 3 times at approximately weekly intervals with 1 lb. of 15% parathion per 100 gal. of water showed no significant absorbed or external residues.

3806. Entomological Branch, Department of Agriculture, N.S.W.
The black field cricket (*Gryllulus commodus*).
Agric. Gaz. N.S.W., 1952, **63**: 189-90, illus.

Severe damage in cauliflower seed beds and various garden crops caused by the black field cricket is reported. Trials with baits for its control showed best results with DDT dust (50%) 3 oz., bran 24 lb., molasses 4 lb. dissolved in 2½ gal. of hot water per acre.

Celery.

(*See also* 3634, 3935j.)

3807. Tarjan, A. C., Lownsbery, B. F., Jr., and Hawley, W. O.
Pathogenicity of some plant-parasitic nematodes from Florida soils. I. The effect of *Dolichodorus heterocephalus* Cobb on celery.
Phytopathology, 1952, **42**: 131-2, bibl. 6, illus.

A mixed population of nematodes, containing 77% *Dolichodorus heterocephalus*, caused a serious decline of celery seedlings. *D. heterocephalus* was the only species which increased in number when confined in pots of soil in which celery was growing, so it is assumed that it caused the decline. Symptoms produced experimentally by inoculation included stunting, chlorosis, production of stubby secondary roots, and a reduction in number of fine feeder roots. The nematode was shown to cause celery rootlet injury and it may thus be a factor in the " red root " complex in Florida.—Plant Ind. Stat., Beltsville, Md.

3808. Phillips, W. R., Browne, F. S., and Poapst, P. A.
Pre-cooling celery.
Reprinted from *Canad. Refrig. J.*, 1952, pp. 4, illus.

Immersing celery in cold water prior to storage appears to be the best means of pre-cooling. For this purpose a mechanically refrigerated precooler was constructed consisting of two insulated metal-lined tanks. The water in the smaller of the two tanks, of about 125 gal. capacity, is cooled by refrigeration coils and is pumped through the larger tank in which the celery crates are submerged. Observations made at the Dominion Experimental Substation, Ste. Clothilde, Quebec, during 1950 have shown that celery pre-cooled for 20 min. in flowing water of 34° F. and then placed in storage at 32° F., with a humidity of 90% or over, was in better condition after 2 months than non-precooled samples kept under the same storage conditions. There was no evidence to suggest that water precooling increased the disorders commonly found in stored celery.

Cucurbits.

3809. Simão, S.
Algumas considerações sôbre a culture da melancia. **(Notes on the cultivation of water melon.)**
Rev. Agric. Piracicaba, 1951, **26**: 271-83.

Watermelons are a very unreliable crop in Brazil. The following factors, on which success depends, are discussed: choice of variety (Florida Favorite, Kleckley Sweet and Tom Watson being recommended), germination capacity of the seed, seed disinfection, time of sowing, choice of soil and site, manuring, spraying, irrigation (necessary from the beginning of lateral formation to the beginning of fruit ripening), and frost protection. Advice is also given on seed production.

3810. Davis, G. N.
Baby Klondike watermelon.
Calif. Agric., 1952, **6**: 5: 15, illus.
Seed is now available in California of this round, midget, fusarium-resistant melon. Test plots yielded an average of 2,896 melons or 16·1 tons per acre, the average weight of a melon being 11·4 lb.

3811. Hartmair, V.
Ist die Bitterstofffreiheit der Treibgurken auf den Wege der Polyploidiezüchtung zu erreichen? (**Does polyploidy offer a means of removing the bitter principle in forced cucumbers?**)
Veröff. Bundesanst. alpine Landw. Admont, Hft **5**, 1951, pp. 22-6, bibl. 4.
The fruits of some of the best forcing cucumber varieties are liable to turn bitter if the water balance of the plant is adversely affected. Györffy stated in 1941 that tetraploids generally are more drought resistant than diploids as a result of their greater capacity to adjust their osmotic pressure to environmental conditions [see *H.A.*, 14: 441]. On this assumption the author treated the shoot tips of several forcing cucumber varieties with colchicine, obtaining about 25% tetraploids in Weigelts Beste von Allen and Schützes Reform and a lower percentage of tetraploids in others. The tetraploid progeny of selfed 4-n plants differed little morphologically from the diploids but was less fertile. Physiological differences, however, appear to be considerable as may be deduced from the freedom from bitter agents in the tetraploids even under conditions that favour their formation. Chromosome doubling may therefore be a means of overcoming bitterness in cucumbers, provided it is possible to improve fertility.

3812. Murtazov, T.
A dinnye oltása lopótökre. (**Grafting of melon on marrow.**) [English and Russian summaries ½ p. each.]
Agrártud. egy.,* 1950, **1**: 101-5, illus. [received 1952].
In experiments in Bulgaria grafting melon on marrow improved yield and hastened maturity of melons without affecting their flavour, which suggests a means of growing the crop in colder climates. Both the stock and scion plants were raised in hotbeds; the grafting being carried out at 20-25° C. and 70-80% humidity. After the danger of late frosts had passed they were planted out in the field at the usual distances. As one man can produce 400-500 grafts a day and success is usually 98-99% the process is considered economical.

* Formerly *Bull. Fac. Hort. Buda.*

3813. Mann, L. K., and Robinson, J.
Cantaloupe fruit set.
Calif. Agric., 1952, **6**: 2: 10, 12.
Fruit set of cantaloupe, *Cucumis melo* var. *reticulatus*, may be increased by removing competing fruits from the same vine and by relying on insect, rather than hand, pollination. A trial showed that the removal of competing fruits 4 days after full bloom of the flower intended for fruiting is essentially as effective as earlier removal. When postponed until 8 days after full bloom fruit drop increased markedly. Studies on unthinned vines showed that the changes producing fruit drop apparently first affect the growth of the fruit as a whole and then the development of structures within the ovule, abscission always occurring several days after the ovaries have ceased to grow. Fruit set in this test did not appear to be affected by the number of ovules fertilized.

3814. McGregor, S. E., and Todd, F. E.
Cantaloup production with honey bees.
J. econ. Ent., 1952, **45**: 43-7, bibl. 4.
Experiments in the Salt River Valley of Arizona showed that commercial production of cantaloupes without pollinators is impossible, the honey bee being practically the only pollinator. Caging bees with the flowers produced melons nearer the crown, which were sweeter, larger and with more seeds than those from open plots. One colony per acre is suggested as adequate to ensure thorough pollination.

3815. Rehm, S.
Male sterile plants by chemical treatment.
Nature, 1952, **170**: 38-9, bibl. 3.
Tri-iodobenzoic acid and 2,4-D applied to whole plants in several concentrations induced male sterility in water melons and tomatoes that lasted for periods of one to several weeks. The effects of maleic hydrazide and NAA on fertility were less pronounced.—Div. Hort., Pretoria.

3816. Vasudeva, R. S., and Nariani, T. K.
Host range of bottlegourd mosaic virus and its inactivation by plant extracts.
Phytopathology, 1952, **42**: 149-52, bibl. 8.
A mosaic virus of bottlegourd (*Lagenaria leucantha*), designated as Cucumis virus 2C, infects inoculated but symptomless leaves of *Datura stramonium*, *Nicotiana tabacum*, *N. tabacum* var. White burley, *Solanum nigrum* and *S. nodiflorum*. The infection is localized, being confined to the inoculated regions of the leaves. Leaf extracts of *Datura stramonium*, *Capsicum annuum*, *Solanum nigrum* and *Lycopersicon esculentum* adversely affect the activity of the virus at different concentrations.

3817. Epps, W. M., and Barnes, W. C.
The increased susceptibility of the Palmetto cucumber to downy mildew in South Carolina.
Plant Dis. Reptr., 1952, **36**: 14-15, bibl. 4.
The Palmetto cucumber, when released to the trade in 1948, showed a high degree of resistance, approaching immunity under field conditions, to downy mildew [*Pseudoperonospora cubensis*]. In recent years, however, it has shown increased susceptibility. It is suggested that a new race of the pathogen is present which has now made fungicidal treatment of this variety necessary. The fungicide programme, which has never given

adequate disease control on the susceptible variety Marketer, has proved satisfactory on Palmetto.—S. Carolina Truck Exp. Stat., Charleston.

3818. Godfrey, G. H.
Cantaloupe powdery mildew control with dinitro capryl phenyl crotonate.
Phytopathology, 1952, **42**: 335-7, bibl. 10.
Observational tests and plot experiments showed that dinitro capryl phenyl crotonate (Iscothan), as a 1% dust, effectively controls powdery mildew (*Erysiphe cichoracearum*) on cantaloupes. Light applications (20 to 25 lb. per acre) gave fair control, while heavier and more thorough applications gave excellent control without injury to foliage.—Texas agric. Exp. Stat.

3819. Wei, C. T., Walker, J. C., and Scheffer, R. P.
Plant nutrition in relation to disease development. VII. Cucurbit wilts.
Amer. J. Bot., 1952, **39**: 245-9, bibl. 10.
This study is concerned with the relation of concentration and balance of nutrient solution supplied the host to the development of two vascular diseases of cucurbits; fusarial wilt of watermelon (*Fusarium oxysporum* f. *niveum* (E.F.Sm.) Snyder and Hansen) and bacterial wilt of cucumber (*Erwinia tracheiphila* (E.F.Sm.) Holland). As the concentration of salts in balanced Hoagland's solution increased, there was a decrease in rate and amount of disease development in watermelon, and an increase in development of cucumber wilt. When unbalanced nutrients were supplied the hosts, the disease index of watermelon wilt was increased slightly but not significantly in low N, low K, and high P; it was reduced more decidedly but in no case significantly in high N and low P; it was increased significantly and most decidedly in high K. In cucumber plants fed unbalanced solutions, bacterial wilt was increased significantly in low N and low K solutions, while the disease indices of plants grown in low P, high N, high P, and high K solutions were either not significantly or not consistently different from those in the balanced solution. [Authors' summary.]—University of Wisconsin.

3820. Lorenz, O. A.
Summer squash storage studies.
Calif. Agric., 1952, **6**: 5: 4.
Changes in starch, sugars and alcohol-insoluble solids occurring in squash fruits stored at different temperatures are recorded. The fruits remained sound for about 14-17 days at 32° F., for about 14 days at 50° F., for 8 days at 60° F. and for 6 days at 70° F. [See also *H.A.*, 22: 518.]

Legumes.

(*See also* 3260, 3289, 3293, 3298, 3306, 3311, 3312, 3319, 3320, 3935h, r, u.)

3821. Groszmann, H. M.
Pulse crops (beans and peas).
Qd agric. J., 1952, **74**: 249-63, illus.
This is an account of the cultivation of the varieties of beans and peas in Queensland. They include French bean (*Phaseolus vulgaris*), and, to a less important extent, lima bean (*P. lunatus*), scarlet runner (*P. multiflorus*), broad bean (*Vicia faba*), snake bean (*Vigna sinensis* subsp. *sesquipedalis*), sword bean (*Canavalia gladiata*), jack bean (*C. ensiformis*), and Tonga bean (*Dolichos lablab*); suitable varieties of pea and their crop management are mentioned.

3822. Gonzalez Rios, P., and Riollano, A.
El mejoramiento de la habichuela blanca del pais (*Phaseolus vulgaris*) por medio de la selección. **(The improvement of native white string beans (*Phaseolus vulgaris*) by selection.)**
Bol. Estac. exp. agríc. Rio Piedras, **94**, 1951, pp. 22, bibl. 6, illus.
String beans (*Phaseolus vulgaris*) are an important foodstuff in Puerto Rico, but local yields are low and two-thirds of the island's requirements have to be imported. After 10 years of extensive experimentation and systematic selection of native white string beans (which have a higher protein content than local or imported coloured beans) varieties Nos. 1329 and 1632 were chosen for distribution. These exceed other local and imported varieties in yield by 30-70%, have high protein and low fibre content (1329 has 26·79% protein and 3·22% fibre) and good cooking qualities. Sowing dates for different districts are given. Although the chosen varieties are comparatively resistant to grasshoppers, insecticidal control is recommended.

3823. Bateman, A. J.
Variation within French bean varieties.
Ann. appl. Biol., 1952, **39**: 129-38, bibl. 9, illus.
The internal variability in seed weight of several varieties and strains of French bean was investigated at the John Innes Horticultural Institution.

3824. Dikshit, N. N.
Vernalization of peas.
Curr. Sci., 1952, **21**: 48-9, bibl. 7.
Vernalizing pea seeds at 45° F. for 4, 6 or 8 weeks before sowing resulted in markedly increased production of root nodules and an increase in the yield of seed compared with untreated controls. The time taken by the plants to flower was not affected.—Govt. Fruit Res. Stat., Saharanpur, U.P., India.

3825. Sreenivasan, A., and Wandrekar, S. D.
Biosynthesis of vitamin C during germination. II. Concomitant changes in ascorbic acid oxidase, glutathione, nicotinic acid, amylase, reducing sugars, phosphatase and free phosphates.
Proc. Indian Acad. Sci., Sect. B, 1950, **32**: 231-51, bibl. 39, [received 1952].
In further observations [for part 1 see *H.A.*, 21: 1642] on changes in ascorbic and dehydroascorbic acids during seed germination daily changes were recorded in mung bean seeds in activities of ascorbic acid oxidase, glutathione, reducing sugars, free phosphates, nicotinic acid, amylase and phosphatase. In general, germination in the dark tended to enhance these activities except that of ascorbic acid oxidase. Seeds of the black pea, *Pisum arvense*, steeped for 24 hrs at 5° C. prior to germination elaborated more vitamin C than seeds soaked and germinated at normal temperatures, although without any correspondingly greater dissolution of stored food material. Studies with heated extracts of germinated mung beans showed that

enzymic and ionic copper oxidation of vitamin C are distinct processes.

3826. KATZ, Y. H.
The relationship between heat unit accumulation and the planting and harvesting of canning peas.
Agron. J., 1952, **44**: 74-8, bibl. 8.
In studies conducted at Wisconsin Agricultural Experiment Station, Madison, on canning peas the heat unit accumulation (i.e. the total heat above 40° F., the "base temperature" below which growth does not occur) necessary to bring the crop to a given stage of maturity was found to be lower when the season was cool and *vice versa*. A method for a controlled system of planting and harvesting to facilitate an even flow to the canneries is outlined.

3827. MELETTI, P.
Reazioni istologiche in plantule di *Pisum sativum* L. trattate con ormoni. **(Histological reactions in pea seedlings treated with hormones.)**
Nuovo G. bot. ital., 1951, **58**: 305-17, bibl. 7, illus.
At Cagliari University pea seedlings submitted to treatments of various length with aqueous solutions of 2,4-D, 10 mg./l., exhibited 3 well-defined histological reactions, viz. (1) stoppage of development of the primary root, (2) increase in diameter of the primary root, and (3) development of a large number of lateral roots. The first reaction was attributed to a change in the polarity of the cells which broadened more than they lengthened and to the stoppage of mitosis in the apical meristem. The second and third were differing manifestations of increased activity of the pericyclic cells. Environmental factors had a great influence on the reaction, especially temperature, which affected its speed; length of treatment had an analogous effect. The effect of decapitation was the same as that of 2,4-D.

3828. MELETTI, P.
Reazioni istologiche in piante du *Vicia faba* L. trattate con 2,4-D. **(Histological reactions in *Vicia faba* plants treated with 2,4-D.)**
Nuovo G. bot. ital., 1951, **58**: 318-36, bibl. 23, illus.
Leaves and stems of *Vicia faba* grown in light and in darkness under various conditions of humidity and temperature were treated with different concentrations of 2,4-D in lanoline. The most frequent and characteristic histological reactions were: (1) bending of the stem due to differential development of cells; (2) formation of tumours in decapitated stems, due principally to stimulation of pericyclic cells which results in the formation of lateral roots in certain cases; (3) hypertrophic phenomena especially in stem cortex cells; and (4) curling of the leaves. Among factors affecting the speed and intensity of the reaction were environmental conditions, especially light, the age of the plant and the concentration of the hormone.

3829. MIKA, E. S.
Effect of indoleacetic acid on root growth of X-irradiated peas.
Bot. Gaz., 1952, **113**: 285-93, bibl. 10.
Irradiated *Pisum sativum* var. Idaho White responded to IAA which was applied to counteract the inhibition of root growth caused by X-irradiation.

3830. MURPHY, H. J., AND TERMAN, G. L.
Fertilizer, liming and seeding practices for processing peas in Maine.
Bull. Me agric. Exp. Stat. **496**, 1952, pp. 16, bibl. 10.
Application of 300-400 lb. of finely ground limestone with the seed increased the yield of shelled peas, over a 5-year period, by 645 lb. per acre on the average. As lime and N were found to have similar effects on yields of peas grown on acid soils, it is concluded that application of the cheaper lime with inoculated peas is more economical than that of the more expensive nitrogen. Application of N is recommended, however, when delayed maturity is desired, and of P and K fertilizers where the soil is deficient in these nutrients.

3831. ADAM, W. B.
Effect of fertilizer on the texture of canned processed peas.
Agriculture, Lond., 1952, **59**: 38-42, bibl. 3.
Tests for toughness of skin and flesh on canned processed peas from manurial trials involving 3 levels each of N, P and K at 4 centres are described. The use of N, as sulphate of ammonia, tended to cause toughening when distilled water was used for processing but not when a medium-hard water was used. Certain other significant differences also occurred in individual trials, but the differences as a whole were too slight to be of practical importance and would not be detected by most consumers.

3832. MURRAY, H. C., KELLENBARGER, S., AND ARMBRUSTER, G. A.
Protein efficiency and methionine content of Alaska peas grown with the use of various fertilizers.
Agron. J., 1952, **44**: 252-3, bibl. 10, being *Sci. Pap. Wash. St. agric. Exp. Stats* **1033**.
Experiments with Alaska peas (*Pisum sativum*) in Washington State showed that protein and moisture contents were relatively uniform with various fertilizers (S, P, Zn, Cu, Mg, B, Mn and Fe), but that protein efficiency varied, in many cases significantly, the highest being with S only. The methionine content was relatively uniform except in the case of peas grown with all the elements used in the experiment, when it was substantially lower.

3833. MEAGHER, W. R., JOHNSON, C. M., AND STOUT, P. R.
Molybdenum requirement of leguminous plants supplied with fixed nitrogen.
Plant Physiol., 1952, **27**: 223-30, bibl. 5, illus.
Experiments have confirmed that garden peas, *Pisum sativum*, and dwarf garden beans, *Phaseolus vulgaris*, grown with nitrate as the nitrogen source require Mo for the completion of their life cycle. Commercially available seeds contain sufficient or more than sufficient Mo (0·5–5·0 micrograms per seed) for normal growth. For the experiments described here first generation seeds from plants grown in Mo deficient culture solutions were used; these contained 0·05–0·1 micrograms Mo per seed and showed severe Mo deficiency symptoms when grown in Mo deficient culture. The symptoms exhibited by peas and beans, which are

different, are described in detail. During early growth plants with and without Mo showed no visible differences in colour or growth rates. Mo deficiency symptoms developed suddenly, after 5 or 6 weeks. Provided the symptoms were limited to mottling, without necrosis, deficient plants recovered visibly within 2 days as a result of adding Mo to the culture solution. Painting leaves with a solution containing Mo, or infiltration with a similar solution arrested progressive necrosis, but a period of two weeks was required to show visible signs of improvement. Recovery after painting was general throughout the plant and the specific leaves receiving the treatment appeared to have little special advantage. Bean and pea plants which did not receive Mo supplements following visible signs of Mo deficiency declined very rapidly, one additional week being sufficient to cause death of most of the interveinal leaf tissue.—Univ. California.

3834. WADE, G. C.
Why did many greenfeast pea crops fail on the north-west coast?
Tasm. J. Agric., 1952, **23**: 153-6, bibl. 2, illus.

Trials showed that this disorder, the most obvious feature of which is pale foliage, the colour ranging from light green to brown, is due to molybdenum deficiency. A practical method of control is to apply molybdenized superphosphate instead of ordinary " super " as fertilizer.

3835. HEWITT, E. J., AND BOLLE-JONES, E. W.
The effects of zinc and copper deficiencies on crop plants grown in sand culture.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 58-62, bibl. 2, illus.

Symptoms of Cu and Zn deficiency obtained in sand cultures are described for dwarf, runner and broad beans, garden peas, alsike and red clovers and lucerne. The large seeded legumes proved less susceptible to Cu deficiency than the small seeded species. Removing the cotyledons of dwarf and broad beans appreciably accentuated the effects. Relative effects of Zn deficiency were less pronounced, and effect of seed size was partly offset by other factors. Duration of sand treatment did not consistently affect the incidence of either deficiency, but water supplies were critical. Once or twice distilled water and demineralized rain water gave similar results, but water from tinned copper stills was unsatisfactory.

3836. QUANTŻ, L.
Die wichtigsten Viruskrankheiten der heimischen Leguminosen. **(The more important virus diseases of indigenous Leguminosae.)**
Reprinted from *Saatgut-Wirtschaft*, 1952, No. 2, pp. 34-7, illus.

Describing and illustrating, among other diseases, the symptoms of virus diseases affecting beans and peas.

3837. BEEMSTER, A. B. R., AND VAN DER WANT, J. P. H.
Serological investigations on the phaseolus viruses 1 and 2.
Meded. Inst. PlZiekt. Onderz. Wageningen, **29**, 1951, pp. 26, bibl. 13, illus.

Antisera were obtained from rabbits injected with phaseolus viruses 1 and 2. The antiserum against virus 1 gave faint agglutination with the sap of *Phaseolus vulgaris* var. Beka infected with phaseolus virus 1 during autumn and spring, but in winter the reactions were negative. Distinct agglutinations in the sap of *Vicia faba* var. Driemaal Wit infected with phaseolus virus 2 were obtained in autumn, spring and winter after mixing the sap with antiserum against phaseolus virus 2. The sap of *Phaseolus vulgaris* var. Beka, infected with one of the two viruses, apparently contains a factor which inhibits agglutination of the solid sap components after mixing with the saturated homologous or heterologous antiserum. Phaseolus virus 1 proved to be associated to a large extent with the solid sap components.

3838. QUANTZ, L.
Untersuchungen über das Erbsenvirus 1 (" Enation "—Mosaik—Virus). I. Seine Wirtspflanzen, Ausbreitung und Überwinterung. **(Investigations on pea virus 1 (" enation " mosaic virus). I. Its hosts, dissemination and overwintering.)**
NachrBl. dtsch. PflSch Dienst., Braunschweig, 1952, **4**: 24-7, bibl. 10, illus.

Susceptible field hosts of the enation mosaic virus of pea are mentioned. Crimson clover and hairy vetch (*Vicia villosa*) carry the disease from the middle of September to the beginning of May, and susceptible summer crops, such as peas, broad bean and vetch should not be grown near them. Sweet peas carry the disease from the end of June to the middle of November, and garden and field peas and broad beans from the end of May to early September.—Institut für Virusforschung, Celle.

3839. CONROY, R. J., AND WILSON, R. D.
Mottle leaf of Tweed Wonder beans.
J. Aust. Inst. agric. Sci., 1952, **18**: 33-8, bibl. 7, illus.

" Mottle leaf " is the New South Wales term for a seed-transmitted variegated leaf condition of Tweed Wonder beans, *Phaseolus vulgaris*, resembling that described by workers in other parts of the world as variegation and one-sided mosaic. The symptoms and experiments on seed transmission are described.

3840. ANGELL, H. R.
Seedling blight. VI. The effect of mixtures of unsterilized soils, and of reinfesting steamed soils, on seedling blight of poppies and peas.
Aust. J. agric. Res., 1952, **3**: 128-36, bibl. 2.

Three series of pot experiments are described which involved mixtures of several soils, three of which had never before been sown to peas and opium poppies or related crops, to determine their effects on seedling blight due to two *Pythium* spp. Where the proportion of one soil added to another was very small the stands of plant were generally unaffected. Where mixing was done in proportions ranging from 3 : 1 to 1 : 3 the transition from good to poor stands with poppies was gradual and with peas was abrupt. The stand of peas appeared to be influenced mainly by the pathogens and was much reduced by incorporating a soil with a high disease potential irrespective of the proportion. By contrast, the stand of poppies was influenced almost

entirely by the conditioning factor, which was the general character of the soil itself. Where four unsterilized soils were each added as inocula to the same four soils which had previously been steam-sterilized, the soil inoculum which caused seedling blight on an unsteamed soil caused a much greater reduction in the stands of peas in all four steamed soils and of poppies in two soils. From the results of these and earlier experiments, it would appear that the factors influencing percentage stands are the different soils, changes in the chemical composition of soils due to steaming, differences in pathogenicity of strains of the organisms in each soil and differences in susceptibility induced in each host species by different soils.

3841. Andersen, A. L., and De Zeeuw, D. J.
Seed treatment studies for damping-off control in garden and canning beans. Report of progress.
Quart. Bull. Mich. agric. Exp. Stat. 1952, **34**: 357-64, bibl. 4, being *Contr. Dep. Bot. Plant Path. Mich. St. Coll.* **52-5.**

Fungicides found effective for the control of damping-off in beans included: Phygon XL, Arasan, Spergon, compounds C & CL-224 and -640, Panogen, Ceresan M when used as dry powder, Semesan, basic copper carbonate, tribasic copper sulphate and Vancide 51.

3842. Crowdy, S. H., and Davies, M.-E.
Studies on systemic fungicides. I. Behavior of groups of reported chemotherapeutants.
Phytopathology, 1952, **42**: 127-31, bibl. 10.

Several groups of compounds were tested against the chocolate-spot disease (*Botrytis fabae*) on broad bean (*Vicia faba*). Compounds previously reported as effective against other diseases effected some reduction of chocolate spot. With the azo dyes and the hydroxyquinolines there was also some correspondence between the behaviour of individual members of the groups in their effect on different diseases. In most cases there was no close relationship between the activity of the compounds in spore germination tests and their behaviour on broad bean.—R.I. agric. Exp. Stat., Kingston, Rhode Island.

3843. Judenko, E., Johnson, C. G., and Taylor, L. R.
The effect of *Aphis fabae* Scop. on the growth and yield of field beans in a garden plot.
Plant Path., 1952, **1**: 60-5, bibl. 1.

The black bean aphid caused the following reductions: 9% in mean total stem length per plant, 15% in mean individual stem length, 43% in weight of yield, 38% in number of pods per plant, 39% in number of beans per plant, 2% in the number of locules per pod and 7% in bean size. Some heavily infested plants were unusually large and produced almost as great a weight of beans as similar clean controls, suggesting resistance to attack.

3844. Delanoue, P.
Enseignements à tirer d'un traitement expérimental contre *Aphis rumicis* L. sur fèves en année sèche. **(Conclusions drawn from a trial for the control of the bean aphid in a dry year.)**
C.R. Acad. Agric. Fr., 1952, **38**: 145-8.

Bean aphids periodically, and often for two or three consecutive years, cause severe losses in Tunisia, sometimes being serious enough to destroy the whole crop. Pinching back the tips of the plants as a control measure is now being replaced by spraying. Trials are described on the application of insecticides in a dry year, using thiophosphate and HCH as dusts and sprays. The best results were obtained with thiophosphate dust 0·75% and spray at 20 g. per hl., applied at the beginning of April.

3845. Lhoste, —., and Leibovici, —.
Utilisation de l'OMPP. **(The use of OMPP.)**
Phytoma, 1952, No. **35**, from abstr. in *Rev. Agric. Brux.*, 1952, **5**: 378-9.

Experiments with OMPP (octamethylpyrophosphoramide) in the control of aphids on beans and chrysanthemum cuttings led to the general conclusion that seeds appear to be resistant and green tissue sensitive to its toxic effects. Immersion of beans conferred immunity for a month or more on the resultant plants. During this time many aphids were destroyed, though their predators were unaffected, and the plants acquired a vigour that enabled them to resist later attacks.

3846. Dunn, J. A.
The effect of temperature on the pea aphid—ladybird relationship.
A.R. nat. Veg. Res. Stat. Wellesbourne for 1951, 1952, pp. 21-3, bibl. 4.

Data presented indicate that low spring and autumn temperatures help the aphid populations to build up by limiting ladybird activity, whereas warm summer weather can help to control the aphid by increasing the efficiency of the ladybird as a predator.

3847. Ashdown, D., and Cordner, H. B.
Some effects on insect control and plant response of a systemic insecticide applied as a spray, a seed treatment, or a soil treatment.
J. econ. Ent., 1952, **45**: 302-7, bibl. 5.

Treatment of peas with the systemic diethoxythiophosphoric acid ester of 2-ethyl mercaptoethanol, applied as a soil, seed or spray treatment or a combination seed plus spray treatment, resulted in a high degree of pea aphid control. Neither seed germination nor permanent plant growth were affected; yields increased directly with the insect control obtained. Residue analyses showed only traces of the toxicant in all but the soil-treated peas which contained 1·6 p.p.m. Eggplants grown in treated soil were protected from both flea beetles and lace bugs, and yielded 2 to 4 times as much fruit as unprotected plants. [From authors' summary.]

3848. Jany, E.
Untersuchungen über das Verhalten des Speisebohnenkäfers. (*Acanthoscelides obtectus* Say.) **(Control of the bean beetle.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1952, **4**: 12-13.

Notes are given on the habits of the bean beetle. The germination capacity of bean seeds in relation to the number of beetle holes in them is tabulated. The beetle lays its eggs preferably fairly near the ground, on runner beans below 1 m. from ground level. In collecting seed for sowing from runner beans, only those seeds in pods produced above 1 m. from the

ground should be selected.—Biologische Zentralanstalt, Berlin-Dahlem.

3849. Middlekauff, W. W.
Insects on baby lima beans.
Calif. Agric., 1952, **6**: 4: 7, 14, illus.
An effective reduction in injury to baby lima beans caused by several pests, notably lygus bugs, and an increase in yield followed two aeroplane applications of 5% DDT dust on September 7 and 20, at rates of about 30 and 35 lb. per acre.

Onions and related crops.

(*See also* 3935o.)

3850. Ownbey, M.
The genus *Allium* in Texas.
Res. Stud. Wash. St. Coll. Pullman, 1950 (issued 1951), **18**: 181-222, bibl. 7, maps.
From a critical study of the genus *Allium* in Texas the 17 taxonomic entities found are grouped into 12 species, one of which, *A. canadense*, includes 5 varieties, and another 2 varieties. Each type is described in detail and a key provided for their identification. [For studies by the same author on *Allium* spp. in Arizona and Idaho, see *H.A.*, 20: 2820 and 2821.]

3851. Vorster, P. W.
Suitable onion varieties for the Transvaal.
Fmg S. Afr., 1952, **27**: 259-60.
Experiments over 5 years at the Pretoria Horticultural Research Station have shown that only short-day varieties, such as Early Cape Flats and Texas Grano, can be profitably grown in the Transvaal. The results are summarized of trials with these varieties on sowing season, transplanting *v.* direct sowing, spacing and seed production. [For a fuller account see *Bull. Dep. Agric. S. Afr.* 316, *H.A.*, 21: 1671.]

3852. Sitnikov, I. A.
The cultivation of perennial tree onions* in the Kuzbas. [Russian.]
Sad i Ogorod, 1952, No. 1, pp. 64-5.
Tree onions [*Allium cepa* var. *aggregatum*] are planted either early in the spring or in the autumn not later than 15-20 September. Abundant moisture is one of the chief requirements of this vigorous plant, and for successful over-wintering in the field an adequate snow covering is desirable. Sets planted during the spring of 1948 produced only a very light yield of aerial bulbs during the same year, 50 cwt. per acre in 1949 and 120 cwt. per acre in 1950. Plants grown for seed are lifted in the autumn and kept in soil-covered trenches at 0 – 3° C. till required for planting the following spring.

3853. Jamalainen, E. A.
Sipulin tuotantoon vaikuttavista haitallisista tekijöistä ja sipulin viljelyn edistämisto-i menpiteistä. **(On factors hampering onion production and on measures for promoting onion cultivation [in Finland].)** [English summary 4 pp.]
Valt. Maatalousk. Tied. **225**, 1952, pp. 45, illus.
Pests and diseases of onions in the field and in storage in Finland as well as the control measures tested are discussed, with special reference to the tree onion, *Allium cepa* var. *aggregatum*. The following pre-storage treatment is recommended: Drying of bulbs and foliage immediately after harvesting for about 20 days at 30-40° C., and, after topping, thorough after-drying of the bulbs for a few days at the same temperature.—Agric. Res. Centre Tikkurila, Finland.

3854. Glumov, G. A.
An onion with bulbs at two levels. [Russian.]
Priroda, 1951, **40**: 11: 60, illus.
A brief note describes a young onion plant which produced a cluster of six secondary bulbs 13 to 42 mm. in diameter on a flowering stem which had been broken by the wind at a height of 21·5 cm. above the primary bulb.

3855. Agati, G.
Indagini ed osservazioni sulla biologia fiorale della cipolla. **(Research on the floral biology of the onion.)** [English summary 9 lines.]
Riv. Ortoflorofrutt. ital., 1952, **36**: 67-77, bibl. 18, illus.
Research on the problem of the production of pure seed in the onion was conducted at Florence University in 1950. The mechanism of flower opening and the manner of pollination are described. The onion is protandrous so that cross fertilization, usually performed by bees, is the rule. To obtain pure seed either monovarietal cultivation is necessary or the isolation of seed-bearing plants in paper bags, care being taken to shake them periodically throughout the flowering period.

3856. Richardson, B. H., and Wene, G. P.
Control of onion thrips in Texas.
J. econ. Ent., 1952, **45**: 258-62, bibl. 15.
Heptachlor, dieldrin, toxaphene, and aldrin applied either as dusts or high volume sprays gave good control of onion thrips, *Thrips tabaci*. A dust mixture of 0·5% γBHC and 5% DDT and a spray mixture of 0·67 lb. toxaphene and 0·33 lb. DDT were also satisfactory. Additions of sulphur and a sticker improved effectiveness in some of the dusts and reduced it in others.

3857. Merrill, L. G., Jr.
Relative effectiveness of various insecticides for control of onion thrips under Michigan conditions.
Quart. Bull. Mich. agric. Exp. Stat. 1952, **34**: 238-44, bibl. 4.
In experiments carried out in 1950 and 1951, 1½% dieldrin was found to be the most effective insecticidal dust against onion thrips, *Thrips tabaci*. Chlordane, lindane, parathion and EPN-300 were also satisfactory, but DDT was less effective. The application of some of these insecticides for the control of onion maggots reduced later thrips populations.

3858. Mann, L. K.
Garlic bulb studies.
Calif. Agric., 1952, **6**: 6: 13-14.
Three series of experiments are summarized.

* "Egyptian onions" in R.H.S. Dictionary, "top" onions in Bailey.

(1) Studies on the effects of photoperiod and temperature showed that long days and high temperatures favour bulbing, the effect being more pronounced with late than with early varieties. (2) When garlic was planted in Nov.-Dec. in the field and in cool and warm greenhouses bulbing occurred earliest in the plants in the warm greenhouse and latest in the field, but with a late variety the differences had become small by the time the plants began to mature in May-June. (3) Bulbs were stored at about 32°, 40°, 50° or 60° F. from Oct. 1 until they were planted on Dec. 18. Plants grown in warm greenhouses from bulbs stored at low temperatures matured earlier than those from bulbs stored at high temperatures, but field-grown plants showed less effect from storage temperatures.

3859. MAHMUD, K. A.
A preliminary report on loop-top of garlic.
Sci. and Cult., 1952, **17**: 296, bibl. 2, illus.
Failure of the leaves to open fully, due to tips remaining caught in the preceding leaf, was observed in 80% of the garlic seedlings in a garden at Nagpur. No organism was found and attempts to transmit the disease by juice inoculations gave negative results.

Root crops.

(*See also* 3290, 3324, 3935f, q.)

3860. MINISTRY OF AGRICULTURE, LONDON.
Root vegetables.
Bull. Minist. Agric. Lond. **120**, 5th edition 1951, pp. 24, illus., 1s. 9d.
As in the first edition of this bulletin [see *H.A.*, 11: 102], the culture of carrots, beetroot, parsnips and turnips is dealt with in some detail, while short sections are devoted to the less widely grown root crops, swedes, Jerusalem artichokes, salsify, scorzonera, celeriac, and kohlrabi. The cultural information has been considerably revised, and a new section dealing with the control of pests and diseases has been included. There is a brief appendix on methods of weed control, and detailed advice on weed control in carrots with light mineral oil sprays is included in the appropriate section.

3861. EDWARDS, G. R.
Insect pests of vegetable crops. VII. Insect pests of root crops.
J. Dep. Agric. S. Aust., 1952, **55**: 506-9, illus.
Descriptions are given of the carrot aphis (*Cavariella aegopodii*), the brown vegetable weevil (*Listroderes costirostris*), and the root knot nematode (*Heterodera marioni*), with recommendations for control.

3862. SUTCLIFFE, J. F.
The influence of internal ion concentration on potassium accumulation and salt respiration of red beet root tissue.
J. exp. Bot., 1952, **3**: 59-76, bibl. 16.
It is shown that, during a period of washing in aerated, distilled water, disks of Red Beet root tissue acquire the capacity to absorb potassium rapidly. Subsequently the rate of accumulation of this ion is closely related to the internal salt-content of the material. On the other hand, whilst the level of salt respiration increases during the preliminary washing, it is not influenced significantly by the internal potassium concentration. The implications of these observations are discussed in relation to a possible mechanism of mineral salt absorption. [Author's summary.]—King's College, London.

3863. WARNE, L. G. G.
Ten per cent. of the carrots should be small to give maximum yield.
Grower, 1952, **37**: 860-1.
Experiments have shown the optimum plant density for carrots to lie between 6 and 16 plants per sq. ft. At 6-10 plants per sq. ft. 11% by weight and 36% by number of the roots were rejected as too small. At wider spacings the percentage rejected declined but so did the total yield of saleable roots; at closer spacings the proportion of rejects rose steeply and progressively. With beetroot the optimum plant density lay between 2·5 and 3·5 plants per sq. ft., and at this spacing 6% by weight and 18% by number of the roots produced were too small. The general conclusion from these trials is that visual inspection of a root crop can lead to an unnecessary fear of overcrowding; about 10% of the crop must in practice be too small if the crop as a whole is to give its maximum yield. [For previous articles by Warne, see *H.A.*, 22: 551, 1564.]

3864. PAISLEY, K.
Fertilizers for horticultural crops. 6. Manures for root vegetables.
Fert. Feed. St. J., 1952, **38**: 180-1.
Detailed advice is given for manuring main-crop and bunched carrots on various soils.

3865. GROGAN, R. G., AND SNYDER, W. C.
The occurrence and pathological effects of *Stemphylium radicinum* on carrots in California.
Phytopathology, 1952, **42**: 215-18, bibl. 13, illus.
Stemphylium radicinum is shown to be capable of attacking the carrot at all stages of growth from the seed to the mature seed plant. When present on untreated seed it causes failure to germinate or seedling blight. These observations indicate the desirability of carrot seed treatment.—University of California.

3866. DALLYN, S., AND SMITH, O.
Effect of applications of growth substances on sprouting of carrots, turnips, and onions in storage.
Bot. Gaz., 1952, **113**: 362-7, bibl. 5, illus., being *Pap. Dep. Veg. Crops, Cornell* **348**.
Sodium NA applied at 3,000 p.p.m. in 135 gal. per acre, 8-10 days before harvest, inhibited sprouting in stored carrots. MENA (methyl naphthaleneacetate) dust at the rate of 1 g. per bushel of roots applied a month after the beginning of storage also inhibited sprouting in both carrots and turnips. Foliage sprays of sodium NA at different rates reduced sprouting in onions, and at low concentrations increased bulb yields.

Salad crops.

(*See also* 3260, 3935f, s.)

3867. SECRETT, F. A., AND OTHERS.
Outdoor salad crops.
Bull. Minist. Agric. Lond. **55**, 5th edition, 1952, pp. 52, illus.

This revised edition covers lettuce, endive, chicory, radish, celery, spring onions, corn salad, ridge cucumbers, tomatoes, watercress, carrots, beetroot and celeriac, and gives the names of good varieties. It deals with suitable soils, methods of cultivation, harvesting and marketing, vegetable washing by machinery, pests and diseases and their control.

3868. RADLOFF, G.
The chicory industry in South Africa.
Fmg S. Afr., 1952, **27**: 211-13, illus.
A brief historical account is given of chicory in South Africa since it was first cultivated in 1895, and of the creation of the Chicory Control Board in 1940. Chicory is grown in the Union almost entirely as a coffee supplement, and for the 5 years preceding 1951 the average production of roots was about 8,000,000 lb.

3869. GROENEWEGEN, J. H.
Nieuwe slarassen voor de teelt onder glas. **(New varieties of lettuce for cultivation under glass.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1952, **15**: 22-8, bibl. 6, illus.
The varieties Cheshunt Early Giant and Cheshunt 5B grew more quickly during the winter, and produced a head earlier than May Queen, but their dark colour is unsatisfactory. Blackpool and Resistant Early French Frame also grew more quickly than May Queen in winter, and may successfully replace that variety, especially as they are less susceptible to marginal scorch.

3870. JACKS, H.
Seed disinfection. II. Effect of various chemicals on the emergence of lettuce and pea seedlings.
N.Z. J. Sci. Tech. Sect. A, 1952, **34**: 122-5, bibl. 2.
Lettuce and pea seeds were treated with commercial seed dressings alone and combined with insecticides, a growth hormone, a nematocide, vitamin B and a copper compound. Dusting with Spergon increased emergence in both, while Agrosan GN was effective only for peas. Addition of DDT to Spergon, and BHC to Agrosan GN did not materially affect their influence. Fixtan, a liquid seed dressing containing phenyl mercury, was not as effective as the dusts Spergon and Agrosan GN, but sometimes the addition of a growth hormone, vitamin B and arseno venadic acid increased its efficiency. Addition of copper did not affect emergence figures in glasshouse tests, but in the field the mixture reduced emergence of lettuce seedlings.—D.S.I.R., Auckland.

3871. GRAINGER, J.
The rapid detection of high salt concentrations in soil likely to damage lettuce plants.
J. Sci. Food Agric., 1952, **3**: 173-5, bibl. 1, illus.
The method described depends upon the fact that when an electric potential difference is applied to soils with high salt contents they heat more quickly, and the final current is greater than with soils of low salt contents. Data for performance are also given. [Author's synopsis.]—West of Scotland Agricultural College, Auchincruive.

3872. PLANT, W.
The control of molybdenum deficiency in lettuce under field conditions.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 113-15, bibl. 4, illus.
Molybdenum deficiency in lettuce.
Nature, 1952, **169**: 803, bibl. 3, illus.
Lettuce, grown on a Lower Greensand soil of pH 5·2 which was known to produce Mo deficiency in cauliflower, showed chlorosis, necrosis, stunted growth and failure to heart. The deficiency was corrected by dressings of ground limestone at 3 or 6 tons per acre or by sodium molybdate at 2 or 4 lb. per acre, but not by dressings of gypsum. Mo-deficient lettuce leaves contained 0·06 p.p.m. Mo and healthy leaves 0·08 to 0·14 p.p.m. In contrast to results obtained earlier with cauliflower, values for ascorbic acid showed little change due to the treatments. [The second article is an abbreviated account.]

3873. FRY, P. R.
Lettuce mosaic.
N.Z. J. Sci. Tech. Sect. A, 1952, **33**: 5: 52-63, bibl. 6, illus.
Lettuce mosaic is shown to be widespread in New Zealand. The causal virus is identified as *Lactuca* virus 1 of Smith. Symptoms on lettuce are vein clearing, mosaic mottling, necrosis, dwarfing and failure to heart, and the yield is greatly reduced. The virus is sap transmitted and carried by 6-15% of seed from infected plants. Commercial lines of seed showed 2 to 3% infection. Natural infection occurs in groundsel plants in the field and the disease has been transmitted experimentally to pea, sweet-pea, endive, aster, cineraria, and marigold.—Auckland University College.

3874. HOFFMAN, J. R.
Leaf hopper control to prevent the spread of the virus disease aster yellows in commercial lettuce production: Part II.
Quart. Bull. Mich. agric. Exp. Stat. 1952, **34**: 262-5, bibl. 1.
Good control of the six-spotted leaf hopper, *Macrosteles divisa*, and reduction in the incidence of aster yellows in lettuce was obtained by spraying the crops with parathion or Experimental Insecticide 4049, and the headland weeds with parathion and DDT. [For part 1 see *H.A.*, 21: 2655.]

3875. BELLEGUEULE, J.
Méthode de lutte contre le meunier de la laitue. **(Control of lettuce downy mildew.)**
Rev. hort. Paris, 1952, **124**: 691-3, bibl. 7.
As a result of experiments on the control of lettuce downy mildew (*Bremia lactucae*) with oxyquinoline sulphate, the following programme is recommended: (1) At sowing time dust the seedbed with oxyquinoline sulphate in talc; (2) before planting out dust the soil with oxyquinoline sulphate in sulphur and dip the roots of the seedlings in oxyquinoline sulphate solution for ½ hr.; (3) a week after planting spray the plants with an aqueous solution of oxyquinoline sulphate.

3876. PETTINARI, C.
Phyllosticta multiformis n.sp. su foglie di *Lactuca scariola* L. (***Phyllosticta multiformis* n.sp. on lettuce leaves.**) [English summary 6 lines.]
Ann. Sper. agrar., 1952, **6**: 119-25, bibl. 14, illus.

A description is given of a fungal leaf infection of lettuce grown near Bari and of the morphology of the organism concerned, *Phyllosticta multiformis* n.sp.

3877. SCHLIEPER, C., AND NIX, H.
Über das Haften von Spulwurmeiern an Salat. (**The adhesion of roundworm eggs on lettuce.**)
Landw. Forsch., 1952, **4**: 74-80, bibl. 9, illus.

In trials at the Zoological Institute of Marburg University eggs of roundworms, *Ascaris lumbricoides*, adhering to lettuce leaves, infected through manuring with human faeces, were removed by soaking the lettuce for 2 hours in solutions of the proprietary preparations "FEWA" (containing primary alkyl sulphates) or "Pril" (a wetting agent), followed by rinsing in tap-water.

3878. LYON, A. G., AND HOWARD, H. W.
Science and watercress growing.
Agriculture, Lond., 1952, **59**: 123-8, bibl. 6, illus.

A 3-year investigation at Cambridge of the waters used to irrigate watercress beds has shown that the majority—those obtained from chalk—contain an adequate supply of all the major nutrients except phosphate. Water obtained from greensand, however, is rich in phosphate. When superphosphate was broadcast at 1-2 cwt. per acre the P_2O_5 concentration of chalk water was increased for only 2-3 days, suggesting that most of it was washed out of the beds; it is suggested that with soft-bottomed beds a better method might be to apply the fertilizer to the soil when the beds are dried off for replanting. From the evidence available at present on changes in temperature, dissolved oxygen and CO_2, pH and nitrate as water flows down a bed it would appear that temperature is the most important of these factors. For this reason relatively short beds are much better than long ones.

3879. SPENCER, D. M.
Watercress investigations.
A.R. nat. Veg. Res. Stat. Wellesbourne for 1951, 1952, pp. 61-8, bibl. 3.

Symptoms of crook root disease in 1950 were first noted in October, recovery setting in after the end of the following March. In laboratory trials the intensity of daylight was found to be a controlling factor in the infection of healthy roots, and inoculation was successful under either short or long exposure to fluorescent lighting. Of certain nutrients and fungicides tested in commercial beds, glauconite increased the vigour of the plants; the others were ineffective. Both green and brown types of watercress were badly infected by the crook root fungus, but the green type was the more tolerant.

3880. RICHAUD, M.
La culture du cresson. (**Growing watercress.**)
Réveil agric. from full page note in *Fruits et Prim.*, 1951, **21**: 339.

This article gives details of the preparation of watercress beds, gathering the crop, sowing the seed, and the control of flea beetle by using DDT dust.

Spinach.

(*See also* 3935f.)

3881. POUND, G. S., AND CHEO, P. C.
Studies on resistance to cucumber virus 1 in spinach.
Phytopathology, 1952, **42**: 301-6, bibl. 4, illus.

Air temperature had a marked effect on development of symptoms and on disease severity in both susceptible and resistant varieties of spinach inoculated with cucumber virus 1. In the susceptible variety, Nobel, high air temperature not only shortened the incubation period, but also increased the lethal effect of the virus. In the resistant variety, Virginian Savoy, resistance was expressed at air temperatures of 16° C. and 20° C.; although plants were not always immune, they resisted infection at those temperatures and were only rarely infected. High soil temperature was not responsible for the development of top necrosis in resistant plants. Other environment factors, such as day length, light intensity and host nutrition, had little effect on the production of top necrosis in resistant plants at 28° C.

3882. CHEO, P. C., AND POUND, G. S.
Relation of air temperature, soil temperature, photoperiod, and light intensity to the concentration of cucumber virus 1 in spinach.
Phytopathology, 1952, **42**: 306-10, bibl. 10.

At 28° C. the virus content increased from about the second to the eighth day after inoculation, then decreased rapidly until death occurred on or about the sixteenth day. A similar virus cycle was also observed in tobacco plants infected with cucumber virus 1. Longer day length and high light intensity favoured multiplication of the virus in spinach.—Univ. of Wisconsin.

3883. MILES, M.
Spinach pest burrows in the stem.
Grower, 1952, **37**: 978-9, illus.

The life history is described of *Hylemyia echinata* Ség., whose maggots have recently been found doing considerable damage to spinach in south and east England. As spraying is impracticable it is suggested that when spring is early, and attacks therefore more likely, it may prove advisable to harvest the crop before it is fully mature and so reduce the period during which it is exposed to the egg-laying flies.

Sweet corn.

3884. ALPATJEV, A. V.
The cultivation of sweet corn in the central zone of Russia. [Russian.]
Sad i Ogorod, 1952, No. 5, pp. 43-5.

The value of sweet corn as a vegetable is mentioned, with notes on its chemical composition, including its vitamins, at the "milk ripe" stage of development. The methods of cultivating it in the central regions of Russia are described, and two varieties raised at the Gribov plant breeding station are mentioned as particularly suitable for growing in those regions.

Sweet potatoes.

(*See also* 3935a, 4530.)

3885. Baudet, —., and others.
Études sur la patate douce. (Studies on the sweet potato.)
Polycopie Serv. Hort. Rabat **6**, 1951, pp. 79, bibl. 3, illus.

This report is divided into 4 parts. (1) A report on the field performance of 26 varieties of sweet potato imported from Algeria and the United States and tested at the Regional Horticultural Station, Dar Bouazza, Morocco. (2) A report on the value of these varieties for industrial purposes, including a detailed description of the tubers of each variety, analyses of their composition, and data on the effect of irrigation on their composition. (3) A translated extract from *Fmrs' Bull. U.S. Dep. Agric.* 1442 "Storage of Sweet potatoes" [see *H.A.*, 18: 2262]. (4) Descriptions of the aerial parts of 27 varieties, together with drawings illustrating leaf shape.

3886. Landrau, P., Jr., and Samuels, G.
The effect of fertilizers on the yield and quality of sweetpotatoes.
J. Agric. Univ. Puerto Rico, 1951 (issued 1952), **35**: 71-87, bibl. 11.

The sweet potato is generally grown on poor land in Puerto Rico. Experiments were undertaken to determine its N, P, K and minor element requirements and the effect of fertilizers in general on its starch and carotene contents. They covered soils varying from loamy sand to clay and with reactions varying from alkaline to acid. Treatments included varying increments of N, P_2O_5 and K_2O, and applications of filter-press cake, liquid fertilizers, and of the minor elements Ca, Mg, Mn, B and Cu. Detailed results are given. Excessive quantities of N caused yield decreases, P had no effect and K gave no consistent increases. Ca and B gave increases in the acid and intermediate soils; Mg, Mn and Cu gave none. Starch content was not affected. Carotene content was increased by N and P when their application also increased yield; K had no significant effect except for a decrease in one experiment. Ca increased carotene content when its application increased pH, but B, Mg, Mn and Cu had no effect. In general the application of 600 lb. of a 8–6–16 formula per acre is recommended. Yields compared favourably with those of the leading sweet potato areas of the U.S.A.

3887. Ezell, B. D., Wilcox, M. S., and Crowder, J. N.
Pre- and post-harvest changes in carotene, total carotenoids and ascorbic acid content of sweetpotatoes.
Plant Physiol., 1952, **27**: 355-69, bibl. 9.

The results of experiments conducted with 4 varieties of sweet potato at the U.S. Plant Industry Station, Beltsville, Maryland, were: (1) carotene and total carotenoid pigments increased in the earlier part of the season, usually reaching maximum concentration about the normal harvest time, and then decreased, while the ascorbic acid content followed a similar pattern in 3 out of the 4 varieties and in all 4 decreased after the normal harvest time; (2) the time of harvest appeared to be of less importance in determining the post-harvest behaviour of carotenoid pigments than the pre-harvest environmental factors, and had relatively little effect on the behaviour of ascorbic acid during storage.

Tomatoes.

(*See also* 3291, 3292, 3294, 3298, 3310, 3935b, c, e, f, k, p.)

3888. Carncross, J. W. [Editor].
American tomato yearbook, 1952.
319 Scotch Plains Avenue, Westfield, N.J. 1952, pp. 36, bibls., $2.

As in other years this bulletin provides information on the food value of the tomato, associations, relevant U.S. literature, state agricultural colleges and experiment stations, varieties, Canadian production, imports and exports of tomatoes both fresh and processed, U.S. production, periodicals and booklets of interest to the industry, and firms providing equipment.

3889. S., E. E.
Tomatoes: best of the old and new.
Grower, 1952, **37**: 1457-61.

Notes are given on the main types and varieties of glasshouse and outdoor tomatoes grown in Britain.

3890. Kružilin, A. S., and Belik, V. F.
Change in protein metabolism of plants during vegetative hybridization. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **81**: 655-8, bibl. 2.

Grafting experiments with tomatoes on pepper, egg-plant and *Physalis* have shown that the rootstock modifies the protein content qualitatively not only in the leaves of tomatoes but also in the fruit and seed. This indicates that vegetative hybridization influences both vegetative and reproductive organs and, through the latter, the progeny.

3891. Choudhri, R. S., and Bhatnagar, V. B.
Some aspects of regeneration in leaf cuttings of tomato.
Proc. Indian Acad. Sci., Sect. B, 1951, **34**: 43-5, bibl. 5, illus.

Leaves of tomato, variety Pocha large red, were rooted at Benares Hindu University. Roots formed not only in the callus region but for some distance along the petiole and also on the petiolules. Shoots arose in leaflet axils at various points and were not confined to the apical region.

3892. Holmberg, D. M., and Minges, P. A.
Field seeding of tomatoes.
Calif. Agric., 1952, **6**: 3: 4.

A survey was made in 1948 of 2,808 acres of field seeded tomatoes grown by 48 growers, information being collected on: area planted flat or on beds, the use of ordinary or coated seed, planting dates, seed rates, depth of planting, time taken to emerge, irrigation, thinning and spacing, hoeings and cultivations, insect damage and control measures used, and causes of failure (one-fifth of the area). Among the points brought to light were: (1) Late sowing (April) had little effect on the earliness of harvest compared with February and March sowing; (2) a seed rate of ¼ lb.

per acre appeared to be ample; (3) depth of planting ranging from ½ to 3½ in. had little effect on the time of emergence; and (4) where plant populations were similar the yields and time of maturity in direct seeded and transplanted fields were much the same.

3893. Leopold, A. C., and Scott, F. I.
Physiological factors in tomato fruit-set.
Amer. J. Bot., 1952, **39**: 310-17, bibl. 21, being *J. Pap. Purdue Univ., agric. Exp. Stat.* 586.

Experiments were carried out to study fruit-set in a John Baer self-sterile strain of tomatoes. Fruit-set was induced either by pollination or by an auxin spray. The following conclusions have been drawn: (1) Tomato fruit-set is strongly and quantitatively dependent upon the presence of mature leaves. Darkened mature leaves are less effective than lighted ones. Both pollinated and parthenocarpic fruit-set have this dependence. (2) Studies with excised flowers have demonstrated that a large number of nutritive materials can substitute for the leaf requirement. These materials include carbohydrates, organic acids of the dicarboxylic acid cycle, organic and inorganic nitrogenous materials, reducing substances, and phosphate. In each of these groups, the best increase of fruit-set was obtained with fructose (57 per cent. fruit-set), fumaric acid (55 per cent.), arginine (56 per cent.), ammonium sulphate (38 per cent.), glutathione (45 per cent.), and potassium dihydrogen phosphate (29 per cent.). (3) Experiments with excised flowers have demonstrated that the capacity for fruit-set is dependent upon temperature, and this dependence is inherent to the ovary itself. An optimum range of approximately 18°-22° C. was found. (4) Tomato fruit-set was found to be dependent upon aerobic conditions. No set was obtained in the absence of oxygen. (5) It was demonstrated that abscissed flowers are capable of setting fruit and that non-abscissed undeveloping ovaries are likewise capable of set and development when supplied with nutritive materials. [Authors' summary.]

3894. Mayberry, B. D., and Wittwer, S. H.
Urea-nitrogen applied to the leaves of certain vegetable crops.
Quart. Bull. Mich. agric. Exp. Stat. 1952, **34**: 365-9, bibl. 6.

Repeated applications of urea foliage sprays increased the total yields of indoor tomatoes and celery and the early yields of outdoor tomatoes.

3895. Govindan, P. R.
Influence of boron on tomato.
Sci. and Cult., 1952, **17**: 519-20, bibl. 6.

Tomatoes were planted in pots containing sand when 25 days old and received a nutrient solution containing different amounts of B as boric acid. In plants receiving no B deficiency symptoms, which are described, appeared 83 and 87 days after germination. Plants receiving 0·5 and 1·0 p.p.m. developed deficiency symptoms later, those receiving 2·0 p.p.m. showed apparent deficiency 10-15 days before harvest, while those receiving 3·0 p.p.m. showed clear toxicity, symptoms developing 113-117 days after germination. It is concluded that the critical B concentration for normal development lies between 2·0 and 3·0 p.p.m.

3896. Govindan, P. R.
The influence of boron on the yield and content of carbohydrate in tomato fruits.
Curr. Sci., 1952, **21**: 14-15, bibl. 8.

Data are presented which show that the number and weight of tomato fruits increase and all their carbohydrate fractions decrease with the supply of increased concentrations of B up to 3 p.p.m.

3897. Nicholas, D. J. D.
Some effects of metals in excess on crop plants grown in soil culture. III. Effects of cobalt, nickel and zinc on growth, metal and chlorophyll contents of tomato.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 87-102, bibl. 23, illus.

(1) The effects of treating tomato, var. Market King, grown in soil with various levels of Co, Ni and Zn were examined in two factorial pot culture experiments. The three metals were given singly and in combination at three milliequivalent levels, making a total of 27 metal treatments. (2) Co or Ni at lower m.eq. levels proved more toxic to tomato than Zn, inducing iron deficiency symptoms and direct metal injury effects. Co reduced yields of roots and Co or Zn depressed those of "tops" in the second experiment. (3) Co, Ni and Zn present in water extracts of young leaves prepared in glass macerators reflected the metal treatments given. (4) The effects of two of the metals on the uptake of the other were studied by chemical tissue tests. (5) The total iron in the ash of young leaves was not significantly changed by metal treatment and did not reflect iron deficiency symptoms. The iron present in the water extracts of young leaves usually paralleled the intensity of chlorosis, especially in the Co and Ni treated plants. As chlorosis became more marked the percentage of soluble iron to total iron was significantly decreased in the leaves. (6) Co, Ni and Zn treatment depressed the total chlorophyll content of the young leaves, but the ratio of chlorophyll A to chlorophyll B, which varied from 2·75 to 3·26, was not significantly changed. Chlorophyll content was significantly correlated with metal content of the water extracts of leaves. A linear regression line fits the data for increased Ni content resulting in decreased chlorophyll status. Xanthophyll and carotene contents were also substantially reduced in chlorotic leaves. (7) There is no clear relation between Fe content of water extracts and total chlorophyll so that further work is required to investigate this point. (8) Mo did not overcome the injurious effects of Co, Ni and Zn on plants, as determined by visual and chemical methods. [Author's summary.]

3898. Forster, W. A.
Some effects of metals in excess on crop plants grown in soil culture. IV. Effects of copper on mineral status of crop plants.
A.R. Long Ashton agric. hort. Res. Stat. for 1951, 1952, pp. 102-12, bibl. 1.

K, Ca, Mg, P, Fe, Mn and Cu status and yield are given for tomato and oat plants grown in soils treated with Cu at various levels. In addition, some effects of Cu on the growth of rye, barley, sugar beet and kale are described. In tomato a total of 563 m.eq. Cu significantly decreased the yield of fruit and increased the

K, Mg and Cu contents of mid-stem leaves. Correlations were found between leaf contents of Cu and K and between Mn and P but not between Cu and Fe. The results confirmed those obtained earlier which showed that it is difficult to reproduce Fe deficiency symptoms in plants treated with copper when these are growing in soil culture. Contrary to the results of sand and water culture experiments the factors of fixation, saturation and subsequent release of Cu in soil play an important part.

3899. McNaught, K. J., and Gdanitz, L. C.
Magnesium deficiency in glasshouse tomatoes.
N.Z. J. Sci. Tech. Sect. A, 1952, **34**: 82-91, bibl. 20.

Mottled yellow-leaf symptoms in glasshouse tomatoes were found to be due to Mg deficiency. The laminae of mid-stem leaves appeared to be best for diagnosis. Effective control was obtained by spraying with 2% $MgSO_4$. Total Mg levels below 0·4% in the dry matter of whole leaves are associated with chlorotic symptoms.—Rukuhia Soil Res. Stat., Dep. Agric., Hamilton.

3900. McNaught, K. J., and Gdanitz, L. C.
Ground serpentine, an effective source of magnesium for glasshouse tomatoes.
N.Z. J. Sci. Tech. Sect. A, 1952, **34**: 126-30, bibl. 15.

Ground serpentine, applied at the rate of 15 tons per acre, prevented the development of Mg deficiency in glasshouse tomatoes growing in Mg deficient soil [see abstract 3899 above], and gave increased yields of high quality fruit. Evidence from the $MgSO_4$ spray and serpentine experiments indicates that the effect of serpentine was a Mg response.—Rukuhia Soil Res. Stat., Dep. Agric., Hamilton.

3901. Govindan, P. R.
Influence of zinc on tomato fruits.
Curr. Sci., 1952, **21**: 15-16, bibl. 11.

With increased doses of Zn up to 2 p.p.m. the number, weight and ascorbic acid content of tomato fruits increased and the different carbohydrate fractions decreased. At 3 p.p.m. the plants were injured with a consequent reduction in all measurements.

3902. Emge, R. G., and Linn, M. B.
Effect of spraying with zineb on the growth and zinc content of the tomato plant.
Phytopathology, 1952, **42**: 133-6, bibl. 13.

From analyses of stems and fruit of tomato plants sprayed in the field with several organic zinc fungicides the highest concentrations of this element in stems were found in general in plants receiving zineb (zinc ethylene bisdithiocarbamate); the results on fruits were inconclusive. Both zineb and zinc sulphate resulted in significant growth rate increases when sprayed on plants grown in a complete Hoagland's solution.—University of Illinois, Urbana.

3903. Anon.
Blossom-end rot of tomatoes.
Agric. Gaz. N.S.W., 1952, **63**: 260-4, illus.

During the 1951-52 season blossom-end rot of tomatoes was more prevalent in New South Wales than for some years past. The causes of the disease are given, and the grower is advised to provide satisfactory drainage, avoid the use of excessive quantities of N fertilizers, and provide windbreaks in exposed positions subject to hot dry winds. In general, the varieties which bear the smaller, flatter fruits are the more resistant.

3904. Ciccarone, A.
Le foglie "argentate" del pomodoro. **(Silvery leaves of tomato.)** [English summary 6 lines.]
Boll. Staz. Pat. veg. Roma, 1950 (issued 1952), **8**: 193-205, bibl. 21, illus.

A silvery coloured condition of the underside of adult tomato leaves has been observed in South Italy. Microscopic examination of affected leaves showed that the epidermis was dry and brittle and the palisade tissues less adherent than in normal leaves. The disorder is due to the exposure of the underside of the leaves to direct sunlight, especially after the plants are staked, when many of the adult leaves are turned upside down. To avoid this trouble, early staking is advised.

3905. Caldwell, J.
Some effects of a plant virus on nuclear division.
Ann. appl. Biol., 1952, **39**: 98-102, bibl. 8, illus.

Observations made at University College, Exeter, on the effects of the aspermy disease of tomato on the formation of the mega- and micro-spores of the plant are recorded. The obvious interference by the virus in the normal meiotic processes suggests that this is the cause of the non-formation of seed in infected plants.

3906. Ciccarone, A.
Osservazioni su alcuni casi di "striatura mista" del pomodoro nei pressi di Napoli. **(Mixed streak of tomato near Naples.)** [English summary 10 lines.]
Boll. Staz. Pat. veg. Roma, 1950 (issued 1952), **8**: 187-91, illus.

Mixed streak of tomato was found early in June, 1951, in Campania, south of Naples. Its widespread occurrence is attributed to the fact that tomatoes and early potatoes are grown in the same soil in immediate succession. In the instance reported, tomatoes were planted in fields in which early potatoes had failed because of floods, and many volunteer potato plants appeared later among the tomatoes. It is suggested that the intensive crop rotations common in those areas should be modified.

3907. Alvarez-Garcia, L. A., and Adsuar, J.
On the occurrence of a tomato disease in Puerto Rico resembling big bud (*Chlorogenous australiensis* Hol.).
J. Agric. Univ. Puerto Rico, 1950, **34**: 327-32, bibl. 3, illus. [received 1952].

Big bud virus of tomato in Puerto Rico was first observed in 1945. The Puerto Rican type is similar to that reported from Australia (*Chlorogenous australiensis*), the main difference in symptomatology lying in the absence of a pronounced bladder-like hypertrophy of the calyx of infected flowers.

3908. Justham, M. C. D., and Ogilvie, L.
Tomato mosaic in relation to source of seed.
Plant Path., 1952, **1**: 64-5, bibl. 1.

In an experiment conducted in 1948 under commercial conditions to compare the incidence of mosaic in tomato plants raised from seed taken from virus-free and infected plants, the distribution of the first plants to show mosaic bore no relation to seed source. This does not accord with Selman's conclusions. [See *H.A.*, 14: 783.]—N.A.A.S., Bristol.

3909. Pasfield, G.
Tomato spotted wilt. Control with DDT sprays.
Agric. Gaz. N.S.W., 1952, **63**: 138-44.

Spraying early tomato crops with 0·1% DDT three times a week for the control of spotted wilt is significantly superior to twice-weekly spraying, which in turn is significantly better than once-weekly spraying with DDT or twice-weekly spraying with 0·1% methoxychlor. The disease was significantly higher in the part of the crop planted out in the middle of October than in that planted out in the middle of September. Observations suggest that *Thrips tabaci* is the only vector of spotted wilt in Sydney.

3910. Fraga, C. G., Jr., and Costa, A. S.
Análise de um experimento para combate de vira-cabeça do tomateiro. (**Analysis of an experiment on the control of tomato spotted wilt.**) [English summary ¼ p.]
Bragantia, 1950, **10**: 305-16, bibl. 4 [received 1952].

All the insecticides tested, viz. Rhodiatox, Fosfern, Hexason 2540 M, Toxaphene and tartar emetic, reduced the number of plants killed by spotted wilt. The higher the concentration of the insecticides, the better was the stand of plants. The effect of treatments on yield, as opposed to stand of plants, is analysed.

3911. Klein, R. M.
Nitrogen and phosphorus fractions, respiration, and structure of normal and crown gall tissues of tomato.
Plant Physiol., 1952, **27**: 335-54, bibl. 33.

In an effort to compare some of the biochemical properties of normal and tumorous tissues of the tomato hypocotyl and to correlate these findings with the modifications in structure that occur during the development of the tissues, a study has been made of the nitrogen and phosphorus compounds, the structure, and the respiratory intensities of these tissues from the time of the induction of the crown gall until the flowering of the plants when the tumours stopped growing. The changes occurring are recorded in detail. [From author's summary.]—University of Chicago.

3912. Carilli, A.
La " plaga " o " pellagra " del pomodoro nel Salernitano. (**A collar rot of tomato in the Salerno region.**) [English summary 10 lines.]
Boll. Staz. Pat. veg. Roma, 1950 (issued 1952), **8**: 173-80, bibl. 12, illus.

A collar rot of tomato caused by *Alternaria solani* was noted in 1951 around Salerno, in southern Italy. The factors favouring infection were excessive summer heat, irregular irrigation, close planting and inadequate nutrition. Control measures discussed include seed treatment, the application of copper oxychloride and fermate immediately after transplanting, regular rotation, avoiding thick sowing, elimination of weeds that would retain moisture, rational irrigation and the burning of infected material.

3913. de Andrade, A. C.
Bases para a previsão do aparecimento de surtos de " requeima " do tomateiro em São Paulo. (**Basis for the forecasting of late blight outbreaks in tomatoes in São Paulo.**) [English abstract 1¼ p.]
Arq. Inst. biol. S. Paulo, 1950/51, **20**: 95-108, bibl. 4.

Weather data from São Paulo city, Brazil, are analysed in relation to incidence of tomato late blight (*Phytophthora infestans*) with the purpose of determining conditions of rainfall and temperature which prevail before and during outbreaks. The critical period occurs when a sudden drop in temperature is followed by rain. It is shown that the conditions which must prevail for the development of the fungus in São Paulo are 2 consecutive weeks with an average mean maximum and minimum temperature under 20·4° C. and a weekly cumulative rainfall of at least 30 mm.

3914. Walter, J. M., and Conover, R. A.
Hereditary resistance to late blight of tomato.
Phytopathology, 1952, **42**: 197-9, bibl. 14.

Small-fruited ornamental tomato types (? *Lycopersicon esculentum* var. *pyriforme*) were observed to have a high degree of resistance to late blight (*Phytophthora infestans*). Results of crossing them with large fruited, susceptible breeding stocks have shown that the resistance is hereditary and due to one main factor, but is affected by one or more modifying factors.—University of Florida, Gulf Coast Experiment Station.

3915. Ferguson, W., Lyall, L. H., and Racicot, H. N.
Tomato breeding for resistance to *Phytophthora infestans* (Mont.) de By. I. Method of inoculation and preliminary results.
Sci. Agric., 1952, **32**: 57-66, bibl. 19, illus., being *Contr. Div. Hort., exp. Fms Serv. Ottawa* **741**.

Literature relating to breeding of tomatoes for disease resistance is reviewed. In comparing the reaction of many tomato varieties, selections and species to inoculation with *Phytophthora infestans* under greenhouse conditions, differences in degree of susceptibility were found. Although complete resistance or immunity was not obtained, the greatest resistance was found in the Philippine tomato selections Nos. 2, 4 and 5.

3916. Bonde, R., and Murphy, E. F.
Resistance of certain tomato varieties and crosses to late blight.
Bull. Me agric. Exp. Stat. **497**, 1952, pp. 15, bibl. 10, illus.

Red Cherry was the only tomato variety, of those tested, which consistently manifested high foliage and fruit resistance to both natural and induced late blight infection. The behaviour of crosses having a Red Cherry parent indicated that this resistance is a dominant character.

3917. Andrade, A. C.
Fungicidas modernos para controlar a requeima do tomateiro. (Modern fungicides for control of tomato late blight.)
Biológico, 1952, **18**: 6-14.

A series of 5 experiments was carried out at Campinas and São Paulo, Brazil, to compare a large number of commercial fungicides with bordeaux mixture for control of late blight of tomatoes (*Phytophthora infestans*). From the results obtained it is concluded that bordeaux mixture gives the best protection to foliage and fruit. Compared with Dithane (250 g. per litre) and Phygon (120 g. per litre), however, it caused a reduction of yield of 11 and 17% respectively. These 2 commercial fungicides gave almost as good protection as bordeaux mixture and are therefore recommended as substitutes.

3918. Keyworth, W. G., and Dimond, A. E.
Root injury as a factor in the assessment of chemotherapeutants.
Phytopathology, 1952, **42**: 311-15, bibl. 15.

Certain types of injury (by hot water, pruning, chemicals) to the roots of tomato plants before their inoculation with *Fusarium lycopersici* resulted in greatly reduced disease severity. It appears that disease-reduction resulted from the root injury *per se* and not from the specific action of any individual treatment. Plants with chemically injured roots removed immediately before inoculation showed as little disease as those from which injured roots were not so removed. Control plants with roots similarly removed became severely wilted. It is thus considered probable that the effect resulted from a change in host resistance and not merely from inhibition of the pathogen at the injured root surfaces.—Conn. agric. Exp. Stat. [See also *H.A.*, 22: 2671.]

3919. Gopal-Krishnan, K. S., and Jump, J. A.
The antibiotic activity of thiolutin in the chemotherapy of the fusarium wilt of tomato.
Phytopathology, 1952, **42**: 338-9, bibl. 3, illus.

Thiolutin, an antifungal antibiotic isolated from *Streptomyces albus*, was tested at concentrations of 10, 20, 40 and 80 p.p.m. on tomato plants inoculated with *Fusarium lycopersici*. All treatments controlled infection but the two higher concentrations also caused distinct stunting and marked epinasty of the leaves.—University of Notre Dame, Indiana.

3920. Ciccarone, A.
Resistenza a *Sclerotium rolfsii*, Sacc.? **([A tomato variety] resistant to *Sclerotium rolfsii*.)**
Ital. agric., 1952, **89**: 180-1, illus.

Five tomato varieties (Quarantino, Re Umberto, Panamerica, Sioux and Sementella) were subjected to a replicated experiment at Caserta in an area in which beet had been heavily infected by *Sclerotium rolfsii* the year before. The percentage of plants remaining healthy was much bigger in Quarantino (99) and Re Umberto (81) than in the other varieties (58% or less). These 2 varieties also gave much higher yields per plot (56 and 54 kg. respectively) than the others (29 kg. or less).

3921. Giles, J. E., and Brock, R. D.
Rate of increase of nematode infestation of tomatoes after soil fumigation.
Aust. J. agric. Res., 1952, **3**: 16-23, bibl. 3.

An experiment [see *H.A.*, 20: 2874] in which the tomato root-knot nematode, *Heterodera marioni*, was effectively controlled by fumigation with D-D was continued until infestation reached the level at which it reduced yields, in order to demonstrate the infestation level before and after fumigation and the rate of population increase. The increase rate was constant and independent of initial infestation. The time interval necessary between treatments proved to be a function of the rate of population increase and the infestation level after fumigation.

3922. Higley, J. C.
Shell D-D for eelworm control.
World Crops, 1952, **4**: 103-4, illus.

Promising results have been obtained from fumigation with Shell D-D against the root-knot eelworm, *Heterodera marioni*, in glasshouse soils used for tomatoes, against the potato eelworm, *H. rostochiensis*, and against the bulb root-rot eelworm, *Pratylenchus pratensis*, in daffodil fields in the Scilly Isles.

3923. Taylor, A. L.
Infection of tomato by *Heterodera* from tobacco soil.
Plant Dis. Reptr, 1952, **36**: 54.

In laboratory experiments it was shown that tomato and tobacco seedlings, planted in potting soil inoculated with nematode cysts from a Connecticut tobacco field, became infested with nematodes which were morphologically similar to *Heterodera rostochiensis*, the potato golden nematode.—U.S. Department of Agriculture, Division of Nematology Investigations.

3924. Sasser, J. N.
Studies on the control of root-knot nematodes (*Meloidogyne* spp.) with Systox spray (E-1059), an organic phosphate insecticide.
From abstr. in *Phytopathology*, 1952, **42**: 343.

Systox concentrations of 0·005 to 1·0%, when applied as a soil drench at the rate of 300 ml. per 5-inch pot to tomato seedlings, greatly reduced infestation and reproduction of the root-knot nematodes, but concentrations of 0·5 and 1·0% were phytotoxic. Cucumber seedlings, grown in 5-inch pots of infested soil drenched with 300 ml. of Systox at 0·05 and 0·1% one week prior to seeding, made better growth than the controls.

3925. Michelbacher, A. E., Middlekauff, W. W., and Bacon, O. G.
Stink bug injury to tomatoes in California.
J. econ. Ent., 1952, **45**: 126, bibl. 3, illus.

The symptoms of injury to tomatoes now known to be due to attack by red-shouldered plant bug, *Thyanta custator*, and consperse stink bug, *Euschistus conspersus*, are described. An aeroplane treatment with 10% toxaphene dust at 30 lb. per acre gave sufficient control of *E. conspersus* to ensure a satisfactory harvest.

3926. DA COSTA LIMA, A.
Agromizideos (Diptera) do tomateiro e de orquídeas. **(Agromyzidae (Diptera) of tomato and orchid plants.)** [English abstract 6 lines.]
Arq. Inst. biol. S. Paulo, 1950-51, **20**: 35-8, illus.

A maggot mining the stems of tomatoes in Colombia was identified as (probably) the larva of *Agromyza caerulea* Malloch. Another, mining the roots of *Cattleya* and *Laelia* orchids in Brazil, was named *A. orchidearum* n.sp.

3927. ENTOMOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, N.S.W.
The tomato mite (*Phyllocoptes lycopersici*).
Agric. Gaz., N.S.W., 1952, **63**: 192-3.

The tomato mite is a very serious pest of tomatoes during the summer and early autumn in New South Wales, and control measures are necessary in all parts of the State. The first signs of infestation are a silvering of the foliage, and drooping and curling of the lower leaves; stems and leaf stalks have a smooth appearance, later both stems and leaves become brown, and the skin of the fruit may become rough and corky. The mites may be controlled by sulphur dusts or sulphur sprays. In some areas a DDT emulsion spray, at 0·05%, is effective.

3928. COSTA, A. S., AND GONÇALVES, R. D.
Cinza ou penugem branca do tomateiro. **(The tomato fungus mite.)** [English summary 6 lines.]
Bragantia, 1950, **10**: 383-4, bibl. 1, illus. [received 1952].

The presence of the tomato fungus mite, *Aceria cladophthirus*, in tomato plantings has been recorded in several localities of the State of São Paulo. Damage caused by the tomato fungus mite is usually greater than that caused by red mite or by other species. Although attacks by mites in tomato plantings are more frequent during the dry season, a high incidence of the tomato fungus mite has been noted in tomato plantings made during the rainy months. [Authors' summary.]

3929. MICHELBACHER, A. E., MIDDLEKAUFF, W. W., AND AKESSON, N. B.
Duster equipment on tomatoes.
Calif. Agric., 1952, **6**: 5: 5, illus.

By fitting a canvas hood and modifying the air intake on a tractor-drawn power take-off duster adjusted to treat 5 rows of tomatoes, just as effective caterpillar control was obtained with 18 lb. DDT and sulphur per acre per application as with 30 lb. applied without the hood.

Other crops.

3930. BACON, J. S. D., AND LOXLEY, R.
Seasonal changes in the carbohydrates of the Jerusalem artichoke tuber.
Biochem. J., 1952, **51**: 208-13, bibl. 13.

Analyses of dry matter, and of the ketose and combined reducing substances in aqueous extracts, have been made on tubers of the Jerusalem artichoke during the period June 1950 to May 1951, confirming the occurrence of a change in carbohydrate composition during the winter months, already noted by several investigators. A change in the positive direction of the optical rotation of extracts has been correlated with an increase in the proportion of carbohydrate components of lower molecular weight estimated by quantitative paper-partition chromatography. The significance of these findings is discussed. [From authors' summary.]

3931. STOREY, I. F.
Tackle cobweb disease early.
Grower, 1952, **37**: 1099, 1101.

Cobweb disease of mushrooms caused by *Dactylium dendroides* is described. At the first sign of the disease, before removing the diseased mushrooms, the affected areas should be watered with a 5% solution of formalin. As a precautionary measure all casing soils should be pasteurized. Dusts, but not sprays, containing zinc-ethylene bis-dithio-carbamate have been found to give some measure of control, 8-12 oz. of a 15% dust being used per 1,000 sq. ft. each application.

3932. BALDINI, E.
Contributo ad una descrizione e classificazione sistematica delle razze di peperone coltivate in Italia. **(A contribution to the description and systematic classification of the strains of pepper cultivated in Italy.)** [English summary 7 lines.]
Riv. Ortoflorofruttic. ital., 1951, **35**: 227-41, bibl. 15, illus.

The identification and description of the different strains of *Capsicum* are required as a preliminary to the biological study of the plant and to the selection of types most suitable for cultivation. Observations were made on a collection of peppers at the Florence horticultural research station between 1949 and 1951. A description is given of the morphological characters of 20 races which, under Irish's system of classification, come within 6 varieties of *C. annuum*.

3933. CHEVAUGEON, J.
Une fusariose du piment en Côte d'Ivoire. **(A fusariosis of pimiento [chilli pepper] in the Ivory Coast.)**
Rev. Mycol. Suppl. colon., 1951, **16**: 81-6, illus., from abstr. in *Rev. appl. Mycol.*, 1952, **31**: 255.

In May 1949 *Fusarium semitectum* var. *majus* attacked a native variety of chilli in a valley near Adiopodoume, Ivory Coast. The first symptom was a necrosis of the floral parts, usually in the order stamens, gynoecium, petals, calyx. Early attack caused fruit failure. Later infection resulted in small flat fruits; dark green spots rapidly appeared at the apex and the entire fruit rotted. In 1949 the wet season was late and May was marked by brief violent tornadoes with dry periods between. The attack ceased as soon as the rainfall became more regular and appeared to be associated with alternate periods of wet and dry weather and an unbalanced water supply.

3934. BOWERS, J. L.
Poke greens—new crop for Arkansas?
Market Grs' J., 1952, **81**: 6: 14-15, illus.

Experiments are in progress at the University of Arkansas on the cultivation of poke greens [*Phytolacca* sp.] growing wild in the eastern and southern U.S.

Noted.

3935.

a COCKERHAM, K. L., AND HARRISON, P. K.
New sweetpotato seedlings that appear resistant to sweetpotato weevil attack.
J. econ. Ent., 1952, **45**: 132.

b DAVIS, L. E.
Harvesting canning tomatoes.
Calif. Agric., 1952, **6**: 3: 5, 14, illus.
[For abstract of fuller article, *see H.A.*, 22: 2656.]

c GOODWIN, T. W., AND JAMIKORN, M.
Biosynthesis of carotenes in ripening tomatoes.
Nature, 1952, **170**: 104-5, bibl. 12.

d HARTMAIR, V.
Ergebnisse der Sortenprüfungen bei Gemüse für das österr. Zuchtbuch in den Jahren 1949 und 1950. **(Results of the vegetable variety tests for the Austrian Variety Register in 1949 and 1950.)**
Ergebnisse der Gemüsesortenversuche des Jahres 1950. **(Results of the vegetable variety trials in 1950.)**
Versuchsergebn. Bundesanst. alpine Landw. Admont, Hft **7** and **10**, 1951, pp. 28 and 32.
For a brief note on the organization of these trials see *H.A.*, 21: 513 and 20: 2716 respectively.

e HESTER, J. B.
Tomato production for the canning industry [in U.S.A.].
Bett. Crops, 1952, **36**: 4: 21-3, 44, illus.

f HINTZE, S.
Sortförsök med köksväxter i södra och mellersta Sverige 1939-1944. Frilandsgurka, lök, morot, purjo, rödbeta, sallat, selleri, spenat och frilandstomat. **(Variety trials with vegetables in southern and central Sweden 1939-1944. Pickling cucumber, onion, carrot, leek, beetroot, lettuce, celeriac, spinach and tomato.)** [English summary 2 pp.]
Medd. Trädgårdsförs. Malmö, **72**, 1952, pp. 54, bibl. 10, illus.
The most suitable varieties are listed.

g JACKS, H., AND SMITH, H. C.
Soil disinfection. XII. Effect of fumigants on growth of soil fungi in culture.
N.Z. J. Sci. Tech., Sect. A, 1952, **33**: 6: 69-73, bibl. 4, illus.

h MINISTRY OF AGRICULTURE, LONDON.
Peas and beans in the garden.
Growmore Leafl. Minist. Agric. Lond. **104**, 1952, pp. 4.

i MINISTRY OF AGRICULTURE, LONDON.
Wireworms.
Adv. Leafl. Minist. Agric. Lond. **199**, 1952, pp. 6, illus., 2d.
Control measures.

j MINISTRY OF AGRICULTURE, LONDON.
Leaf spot of celery.
Adv. Leafl. Minist. Agric. Lond. **241**, 1952, pp. 4, illus., 2d.

k MINISTRY OF AGRICULTURE, LONDON.
Tomato leaf mould.
Adv. Leafl. Minist. Agric. Lond. **263**, 1952, pp. 4, illus., 2d.

l MINISTRY OF AGRICULTURE, LONDON.
Club root.
Adv. Leafl. Minist. Agric. Lond. **276**, 1952, pp. 6, illus., 2d.

m MITCHENER, A. V.
Aldrin, DDT, dieldrin and other insecticides for control of imported cabbageworm.
J. econ. Ent., 1952, **45**: 136-7, bibl. 1.
DDT, TM1 and TM2 were effective against *Pieris rapae* at Winnipeg.

n NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.
Some causes of variation of output in multiple unit vegetable seed drills.
N.I.A.E. tech. Mem. **37/1166/49/hort. I.**, 1951, pp. 24, illus. [not for publication].

o NEWHALL, A. G., AND RAWLINS, W. A.
Control of onion blast and mildew with carbamates.
Phytopathology, 1952, **42**: 212-14.
Full account of work briefly noted *H.A.*, 22: 2624.

p OGATA, K., IMAYUKI, T., AND NARUSE, M.
Studies on the storage of perishable agricultural products. III. Biochemical studies on the after-ripening of tomatoes. [Japanese with English summary 8 lines.]
Tech. Bull. Kagawa agric. Coll., 1951, **2**: 121-9, bibl. 19.

q PAISLEY, K.
Fertilizers for horticultural crops. 7. Manures for beetroot, parsnips and turnips.
Fert. Feed. St. J., 1952, **38**: 333-5.
Detailed advice is given for various soils.

r PRASAD, N., AND DESAI, M. V.
Fusarium blight of cluster beans.
Curr. Sci., 1952, **21**: 17-18, bibl. 4.
Disease on *Cyamopsis psoraloides* caused by *Fusarium moniliforme* described.

s LE RICHE, F. J. H.
Studies on the processing of vegetables. III. The chemical composition and nutritional value of lettuce varieties (*Lactuca sativa* L.).
Sci. Bull. Dep. Agric. S. Afr. **260** (*Fruit Res. tech. Ser.* **10**), 1946, pp. 7, bibl. 10, illus., 3d. [received 1952].

t ROY, R. S., AND CHOUDHURY, B.
Box cultivation of vegetables.
Indian Fmg, 1951, **12**: 16-21.
Advice on growing vegetables in towns.

u WHEATLEY, G. A.
Notes on insecticidal dust deposits with special reference to the pea aphid (*Acyrthosiphon pisum* Harris).
A.R. nat. Veg. Res. Stat. Wellesbourne for 1951, 1952, pp. 24-30, bibl. 6.
With DDT.

POTATOES.*

General.

(*See also* 3260, 3324, 4529, 4531, 4542, 4545.)

3936. Boyd, D. A., and Dyke, G. V.
Maincrop potato growing in England and Wales.
N.A.A.S. quart. Rev., 1950, **10**: 47-57, bibl. 7.

As average potato yields had long appeared low according to the Ministry of Agriculture's estimate, a special survey was started in 1948. Average maincrop yields in 1948 and 1949 were found to be about 1¾ tons per acre more than the Ministry's estimate of main crop and second earlies, yields of ware in these two years being 9½ and 8½ tons respectively. The standard of cultivation, manuring and seed was in most cases satisfactorily high, thus 60-70% of maincrop was planted with certified seed and almost all the remainder with once-grown seed; 90-95% received a complete fertilizer; average dressings on treated fields in 1949 were equivalent to 12½ cwt. per acre of compound districts—and 5-10% by more careful and complete fertilizer. It was considered that yields could be increased say 5% by earlier planting—10 days in most districts and 5-10% by more careful and complete lifting of the potatoes.

3937. Sherwin, R. A.
Tasmanian potato industry.
Quart. Rev. agric. Econ., 1951, **4**: 60-3.

A survey of potato production costs in Tasmania was carried out in 1950 by the Bureau of Agricultural Economics. Crop yields averaged 3·44 tons per acre, which was slightly below that of preceding years. Costs of production, which are itemized and discussed, averaged £13 6s. 6d. per ton for this yield which allowed an average profit margin of £1 5s. 6d. per ton or £4 7s. 10d. per acre. Factors influencing production are indicated.

3938. van der Paauw, F.
Een levensbeeld van de aardappelplant. **(The adaptation of the potato plant.)**
Reprint from *De Pootaardappelhandel*, 1951, Vol. **4**, No. 9, pp. 2.

The environmental requirements of the potato plant are discussed in relation to its geographical origins.

3939. Ballot, —., and others.
Études sur la pomme de terre. **(Studies on the potato.)**
Polycopie Serv. Hort. Rabat **8**, 1952, pp. 82, bibl. in text.

Five experiments on potatoes carried out by the Service de l'Horticulture, Rabat, during 1949 and 1950 are here reported. Experiments (1) and (2), variety trials, have been published elsewhere [see *H.A.*, 21: 3680 and 22: 641]. (3) The same 11 Dutch varieties tested in experiment 2 were grown in other localities and as main crops. The yields were considerably higher than when they had been grown as early crops. The best results were given by Ultimus and Saskia. (4) A spacing trial was carried out with the 3 varieties Ackersegen, Étoile du Léon and Royal Kidney, grown as spring/summer and autumn/winter crops. In both seasons the highest yield per plant was obtained from 0·80×0·45 m. spacing, and the highest yield per ha. from 0·7×0·4 m. spacing. (5) A series of experiments on the storage of ware potatoes harvested during June/July showed that when certain growth inhibitors [unnamed] were used, tubers could be stored for 3-4 months provided the temperature was below 26° C. When the temperature exceeded 26° C. storage was only possible for 2 months. The natural phosphates Kourifos and Hyperfos did not inhibit sprouting or give good protection against rots, but they may be useful against the potato tuber moth.

* N.B. This is the last appearance of potatoes in *Horticultural Abstracts*. As from 1953 they will be dealt with in *Field Crop Abstracts*.

Varieties and breeding.

(*See also* 4017a, b, c.)

3940. Jähnl, G.
Ergebnisse der Kartoffelversuche 1950. **(Results of the potato trials in 1950.)**
Ergebnisse der Kartoffelversuche 1951. **(Results of the potato trials in 1951.)**
Versuchsergebn. Bundesanst. alpine Landw. Admont, Hft **8**, 1951, pp. 31, and Hft **15**, 1952, pp. 27.

The reports contain detailed data on variety trials, time of planting, seed cutting and sprouting [see also abstracts 3955 and 3956 below], climate and a few other subjects.

3941. Boock, O. J., and Paiva Neto, J. E.
Produtividade e composição mineral de diferentes variedades de batatinha. **(Productivity and composition of some potato varieties.)** [English summary ½ p.]
Bragantia, 1950, **10**: 161-76, bibl. 10 [received 1952].

Trials with 10 potato varieties were carried out in 6 localities in the state of São Paulo, Brazil, to study yield, earliness and disease and pest resistance and to determine their mineral composition. Bintje and Eigenheimer had the highest yields, followed by Voran, Doré and Alpha. Libertas, Alpha and Voran matured late, while Eersteling, Doré, Saskia and Geelblon were early. Alpha and Voran proved somewhat resistant to phytophthora blight, but Eersteling, Saskia and Doré were very susceptible. Doré was susceptible to hollow heart; Eigenheimer and Bintje showed a tendency to produce second-growth tubers; Saskia proved somewhat resistant to common scab, rhizoctonia and root-knot nematode; Geelblon was very susceptible to spindle-tuber. The results of chemical analyses showed that, in general, the tuber skin has a higher water content and is richer in Mg, Ca and K than the flesh. P was found in equal amounts in skin and flesh.

3942. Couto, F. A. A.
Introdução de novas variedades da batatinha (*S. tuberosum* L.) da Holanda para Minas Gerais. **(The introduction of new potato varieties from Holland into Minas Gerais.)** [English summary 1 p.]
Rev. Ceres, 1951, **8**: 395-405, bibl. 5.

Observations on 22 varieties of potato introduced into Minas Gerais, Brazil, from Holland are recorded with reference to growth, period of growth, diseases, stand, yield and grading. Lomman proved the best.

3943. Boock, O. J.
Variedade de batatinha "Eigenheimer" (*Solanum tuberosum* L.). **(The potato variety Eigenheimer [in Brazil].)** [English summary ¼ p.]
Bragantia, 1950, **10**: 371-82, bibl. 14, illus. [received 1952].
A detailed study is reported of the behaviour, disease-resistance and market value of the Eigenheimer potato variety in the state of São Paulo, Brazil. In conclusion it is recommended for cultivation until a better variety is available.

3944. Shipton, J.
Potato varieties for dehydration.
Food. Pres. Quart., 1951, **11**: 27-32, bibl. 5.
To produce good dehydrated potatoes the raw material must be of high culinary quality. Of the many varieties examined by the Division of Food Preservation, C.S.I.R.O., Aust., Sebago, Sequoia, Katahdin and Up-to-Date were found most suitable for dehydration.

3945. Schick, R., and Jacob, E.
Der Wiederaufbau der Kartoffelzüchtung in der DDR nach 1945. **(The reorganization of potato breeding in Eastern Germany after 1945.)**
Züchter, 1951, **21**: 211-22.
After the recent war a complete reorganization of seed potato raising and potato breeding became necessary in Eastern Germany, as practically the entire virus-free stock had been maintained to the East of the Oder, a territory which is now Polish.

3946. Stanton, W. R.
Bolting, a vegetative variation in the potato.
Heredity, 1952, **6**: 37-53, bibl. 22, illus.
Bolters occur in early varieties of potatoes as vegetative mutations to later tuber formation and abundant flowering. The phenotype of bolters can be changed to normal by restricting the length of day in summer. In grafts the scion determines the bolting behaviour. Each variety was found to have a characteristic frequency of mutation, with a range in the degree of lateness of the bolters, and the frequency of bolting was more dependent on the variety than on the type of the parents. It is concluded that bolting differs from any known type of nuclear and cytoplasmic inheritance.—John Innes hort. Instn.

3947. Skvirskaja, S. B.
Altering the rest period of potato tubers by vegetative hybridization. [Russian.]
Priroda, 1951, **40**: 11: 60-1.
By grafting certain varieties of potato as scions on other varieties it was found possible to lengthen or shorten, according to the varieties used, the resting period of the tubers which developed on the "rootstock" variety.

Sprouting and sprout inhibition.

3948. Naka, J., and Omori, H.
Physiological and ecological studies on potato plants. IV. Investigation on the mechanism of earlier maturity and yield-increase of potatoes due to sun-sprouting. [Japanese with English summary ⅔ p.]
Tech. Bull. Kagawa agric. Coll., 1951, **2**: 139-43, bibl. 8.
Potato plants raised from seed tubers sprouted in sunlight showed by comparison with control plants, higher chlorophyll content in the leaves, a decline earlier in the season in the respiration of both shoots and new tubers, and earlier tuber maturity associated with earlier accumulation of carbohydrate reserves.

3949. Tizio, R.
Efecto de las altas temperaturas como factor de degeneración de la papa. **(High temperatures as a factor in potato degeneration.)** [English summary ½ p.]
Phyton, 1951, **1**: 69-89, bibl. 27.
In experiments carried out at the National University of La Plata, Argentina, virus-free Katahdin seed potatoes were sprouted at low temperatures (average 7·3° C.) and at high temperatures (average 25° C.) for 45 days before planting. The yield of the low temperature group was 32·2% higher, and the number of tubers produced was 41·7% more than in the high temperature group. The treatments had no effect on height of plants, vigour or flowering. These results indicate that virus diseases or the successive elimination of sprouts during storage are not the only factors responsible for degeneration.

3950. Burton, W. G.
Studies on the dormancy and sprouting of potatoes. II. The carbon dioxide content of the potato tuber.
New Phytol., 1952, **50**: 287-96, bibl. 30, illus.
This study was made to determine the CO_2 content of potato tubers taken from storage at intervals before and after sprouting started, in order to ascertain whether there was any evidence for dormancy in the potato tuber being a state of CO_2-induced auto-narcosis. The method commonly used for the extraction and estimation of the CO_2 in plant tissue, by boiling the tissue in alcohol and absorbing the evolved gas, was adapted to give reasonably reliable results with about 10 g. of tissue. The apparatus is described and illustrated. No evidence was found of any relationship between the size or moisture content of a tuber and its content of CO_2, nor was there any marked change in the CO_2 content during the storage of unsprouted tubers. An increase followed sprouting and its magnitude was directly correlated with the weight of sprouts. About 60-75% of the CO_2 present was in a combined form, and it seemed possible that an appreciable proportion of this might exist in some form other than bicarbonate. There was a direct correlation between the pH of the cell sap and the content of CO_2 of the tissue, presumably due to variation in the content of the combined CO_2 at different pH.—Ditton Laboratory, East Malling, Kent.

3951. Hemberg, T.
The significance of the acid growth-inhibiting substances for the rest-period of the potato tuber.
Physiol. Plant., 1952, **5**: 115-29, bibl. 14.
In an investigation involving 4 potato varieties it was found that the acid growth-inhibiting substances in the peel disappear at the end of the dormant period. In the case of artificial dormancy breaking by ethylenechlorhydrin the decrease was noticeable within 3 days from the beginning of the treatment. By contrast, the level of the neutral inhibiting substances remained constant. The results of this study suggest that the acid growth-inhibiting substances play a part in regulating tuber dormancy and further that no relation exists between the quantity of auxin in the peel and the length of the dormant period.—Stockholm Univ.

3952. Steineck, O.
Untersuchungen über die keimhemmende Wirkung von α-Naphthylessigsäuremethylester auf Kartoffelknollen. **(On the sprout-inhibiting action of the methyl ester of α-naphthylacetic acid in potato tubers.)**
Bodenkultur, 1952, **6**: 55-60, bibl. 7.
The methyl ester of α-naphthylacetic acid was applied as a dust in a talc carrier at the rate of 150 g. per 100 kg. to potato tubers just removed from a clamp. After treatment the tubers were stored from 18 March to 10 May 1950. The tabulated data obtained in laboratory tests and field trials clearly show that the chemical has an inhibiting effect on sprout development as regards both rate of growth and number of sprouts formed. Owing to the reduced number of sprouts per plant treated tubers yielded only 11·2 kg. per plot as against 15·1 kg. from the controls. The need for uniform distribution of the dust, especially in the case of seed potatoes, is emphasized.

3953. Garay, O. A., and Pasquale, D. R.
Primeros resultados de los ensayos sobre inhibición de brotación en papa. **(First results of experiments on the prevention of sprouting in potatoes.)**
Idia, 1952, **5**: 49: 1-4, illus.
In Argentina potatoes are generally stored in the open in straw- or husk-covered clamps, and the considerable deterioration from sprouting and evaporation that occurs necessitates the periodical importation of seed potatoes. Potatoes derived from stock imported 3 years previously were treated with 2 sprout-inhibiting chemicals. Fusarex (3% tetrachloronitrobenzene) at 4,500 g. per ton of potatoes effectively reduced loss from sprouting in open and in field storage, especially the latter, and also reduced loss from evaporation though to a lesser extent. Tuberite (3% isopropylphenylcarbamate) was tested only in field storage and at 1,100 g. per ton of potatoes effectively reduced loss from sprouting but slightly increased the loss from evaporation. The effectiveness of Fusarex was greatest with potatoes kept in cold storage and decreased progressively with potatoes stored in sheds, stored in sheds until 2 months before planting and then piled in the open, and stored in the usual clamps in the open.

Cultivation practices.

(*See also* 3962, 4017g, o.)

3954. Dobrenov, M.
Razmnožavanje krompira reznicama. **(Propagation of potatoes by cuttings.)**
Arh. poljopr. Nauk., 1951 (issued March 1952), **4**: 6: 153-6, illus.
It has been proved that, by the application of suitable agricultural measures, potatoes can be raised by cuttings. The method is economical in that it effects a saving of seed, and may be specially recommended for selection purposes and for use by small-scale growers. D.S.

3955. Jähnl, G.
Grössere Kartoffeln aus geschnittenem Saatgut? **(Larger tubers from cut seed potatoes?)**
Veröff. Bundesanst. alpine Landw. Admont, Hft **6**, 1952, pp. 86-9, bibl. 6.
In one year's trials seed potatoes of the early variety Böhms Allerfrühste yielded a higher proportion of large tubers (over 7 cm.) when cut in halves than when left uncut. There was no statistically significant difference in the proportion of medium sized tubers (7–4 cm.), but the proportion of small tubers (under 4 cm.) was greatest from uncut seed. The other early variety tested, Frühbote, showed the opposite response to seed cutting.

3956. Jähnl, G.
Über Schneiden und Vorkeimen von Saatkartoffeln. **(On the cutting and sprouting of seed potatoes.)**
Veröff. Bundesanst. alpine Landw. Admont, Hft **6**, 1952, pp. 90-123, bibl. 7, illus.
Three years' trials with three early potato varieties showed that seed cutting never increased but often depressed yields. In all three varieties uncut seed potatoes yielded the highest number of tubers per plant, but in two varieties the average weight of the tubers was lower. The effect of seed cutting on size distribution was found to vary with year and variety. In a comparison of 3 methods of sprouting (no sprouting, sprouting in the dark and in the light) no significant difference was observed. Detailed data on the effect of 15 treatments applied are tabulated.

3957. Petrov, N. P.
Trials in planting potatoes in clumps on the square. [Russian.]
Sad i Ogorod, 1952, No. 4, pp. 54-6.
An account is given, with details of procedure, of growing potatoes planted in twos in holes on the square, 70 cm. apart. The results tabulated for a number of farms in various regions show an increase in yield of 19 to 75 centners per ha. for the " squared-clumps " as compared with ordinary spacing.

3958. Pratt, A. J., and others.
Yield, tuber set, and quality of potatoes.
Bull. Cornell agric. Exp. Stat. **876**, 1952, pp. 35, illus.
Potato yields in New York State in 4 years were significantly increased by irrigation and early planting. Straw mulch tried only in one year resulted in a small yield

increase. No one variety was found consistently to be the best and the greatest variations in yield were associated with location. Tuber numbers varied directly with yield in nearly all cases, but as regards weight of tuber variety was the most important factor with location second. Specific gravity was most influenced by location and by variety.

3959. Jacob, W. C., and Russell, M. B.
The effect of tillage practices on the yield of Irish Cobbler potatoes.
Amer. Potato J., 1952, **29**: 136-41, bibl. 1, being *Pap. Dep. Veg. Crops, Cornell Univ.*, **345**.

During the 4 years in which the experiment was conducted, discing produced significantly fewer potatoes than ploughing either by the ordinary mouldboard plough or the TNT subsoil plough. Killifer treatments (subsoil cultivations) were also found detrimental when applied too often and too closely, except when combined with irrigation and TNT subsoil ploughing. Only in 1 out of 4 years did irrigation result in a significant yield increase.

3960. Kunkel, R., Edmundson, W. C., and Binkley, A. M.
Results with potato vine killers in Colorado.
Tech. Bull. Colo. agric. Exp. Stat. **46**, 1952, pp. 36, bibl. 26, illus.

The effects of various methods of killing potato vines upon yield and tuber quality were studied in relation to plant maturity and soil moisture for a 3-year period. It was found that vine killing generally reduced the yield and the specific gravity of the tubers. Tuber colour was a more intense red on early harvested than on late harvested potatoes. Skinning was reduced by vine killing but it was further reduced by allowing the tubers to remain in the soil an extra week after the vines were killed. Irrigating 4 days prior to vine killing increased the yield, decreased the specific gravity of the tubers and decreased the amount of stem-end discoloration resulting from vine killing. Age of the vines when killed was of little importance in determining the amount of stem-end discoloration obtained. The specific gravity of the tubers late in the season was sometimes lower than early in the season, depending upon growing conditions. Of the vine-killing methods tested, beating off the vines was found superior to the other mechanical methods studied, and sodium arsenite was considered preferable to any of the other chemical sprays. [From authors' summary.]

3961. Large, E. C. (compiled by).
Trials of substitutes for sulphuric acid for potato haulm killing. II. Blight in tubers.
Plant Path., 1952, **1**: 56-9.

The effects of the different haulm-killing treatments described earlier [see *H.A.*, 22: 2751] on the amount of blight in potato tubers were investigated. Under 1951 conditions the sole value of haulm destruction was to facilitate lifting and there were no differences in the amount of blight in the tubers following mechanical or chemical haulm destruction or the "biological destruction" which results from leaving the haulm to be killed off by blight itself.

Manuring.

(*See also* 3985-3987.)

3962. Kapoor, S. L.
Importance of manuring in potato crop raised from cut pieces.
Proc. Indian Acad. Sci., Sect. B, 1951, **34**: 99-108, bibl. 8.

As part of a series of experiments on the effects of size of seed tubers or sets [see also *H.A.*, 20: 2890-2893 and 22: 2706], a pot culture trial was carried out in 2 successive seasons at Benares Hindu University to determine whether heavy manuring could compensate for the use of small seed pieces. Three levels of manuring with cow dung+sulphate of ammonia, 3 sizes of sets (¼, ½ and whole tubers) and 3 sizes of tuber (20, 40 and 80 g.) were used. Heavy manuring markedly increased the yield, number and size of tubers produced as compared with no manure or light manuring. The larger sets and the larger tubers both increased the yield and number of tubers but reduced their average size. With no manure the ¼ tuber sets gave significantly lower yields and numbers of tubers than larger sets, but with heavy manuring the differences became very small; the effect of size of set on size of tubers formed was not, however, altered by the level of manuring. Similar interactions occurred between size of seed tuber and manuring. An examination of the interactions between size of set and size of seed tuber showed that both maintained their individual effect under all levels of the other factor. These results suggest that with heavy manuring it would be practicable to use small sets, either whole or cut, without materially affecting the yield of the crop.

3963. Walker, T. W.
Experiments on the manuring of potatoes in the West Midland province [of England and Wales].
N.A.A.S. quart. Rev., 1952, **15**: 126-33, bibl. 2.

Three types of experiment on the manuring of potatoes were carried out in the N.A.A.S. West Midland province. (1) Dressings of 0, 5, 10, 15 and 20 cwt. per acre of NCF No. 1 [7% N, 7% P_2O_5, 10·5% K_2O], when applied by hand after ridging and before planting, the ridges then being split back, gave yields of 7·8, 10·3, 11·5, 12·2, and 13·0 tons per acre respectively. (2) A 3-level NPK experiment in the absence of dung indicated that K is the most important fertilizer followed by N and then P. In three 8-plot dung NPK experiments consisting of 2 blocks with and 2 without dung, fertilized with various combinations of 4 cwt. sulphate of ammonia per acre, 4 cwt. superphosphate and 1½ cwt. sulphate of potash, dung had an outstanding effect. Tentative conclusions from this series of experiments were (1) dung can be relied upon to give profitable increases in yield; (2) N need not be reduced when dung is used and it should be profitable to apply as much as 4-5 cwt. of sulphate of ammonia; (3) P only gave response at one centre when dung was used, but none of the soils was deficient in P; (4) K gave profitable increases even when dung was used and even more potash might profitably be applied, but all the soils were deficient in K.

3964. Ferwerda, J. D.
Over de werking van stalmest op bouwland. **(The action of farmyard manure on arable land.)**
Versl. Landbouwk. Onderzoek., 1951, **57**, No. 13, pp. 59, from abstr. in *Soils and Ferts*, 1952, **15**, No. 1068.

Experiments with farmyard manure on reclaimed peat and sandy soils involved comparing its action at 5 different rates of application with that of 4 different levels of Nitrochalk, both being used with and without K_2SO_4. F.Y.M. alone, irrespective of application rate, produced more yellowish colouring and lower N content in potato foliage than on plots receiving no N. The growth of the plants and yield of tubers increased with the amount of F.Y.M. applied, and maturity was less delayed than with mineral N. Yield increase per kg. of N applied was higher for mineral than for organic N, and on some fields maximum production was not attained even with 200 kg./ha. of Nitrochalk. In general the amount of N which Nitrochalk had to supply to equal the action of 100 kg. of F.Y.M.-N was 40 kg., but where the F.Y.M. was ploughed in almost immediately after spreading, this rose to 50 kg.

3965. Hawkes, J. G.
Otros aspectos del mejoramiento de la papa en Colombia. **(Other aspects of potato improvement in Colombia.)**
Bol. téc. Inst. nac. Agric., Maracay, Venezuela, **1**, from abstr. in *Bol. inf. Colombia*, 1952, **3**: 25: 14-15.

In an experiment at the Usme Experimental Station, Colombia, on *parama* soil with 3 different levels of N, P and K in all possible combinations the development of potatoes was normal in all treatments containing P, the presence or absence of the other elements having no influence, and poor on all plots without P. Experiments to determine the symptoms of deficiency of trace elements are in progress.

3966. Boock, O. J., and de Castro, J. B.
Efeito do nitrogênio, fósforo e potássio na adubação da batatinha—*Solanum tuberosum* L. **(The effect of nitrogen, phosphorus and potassium fertilizers on potatoes.)** [English summary 9 lines.]
Bragantia, 1950, **10**: 221-33, bibl. 23, illus. [received 1952].

Five N, P, K, potato fertilizer trials were carried out on different soil types in the state of São Paulo, Brazil. It was found that N increased plant growth, intensified green colour of the foliage, retarded maturity and increased susceptibility to fungus diseases. P increased yields, shortened the vegetative period and had the greatest effect on increasing tuber production. K induced a light green colour of the foliage but otherwise had almost no effect on plant development. A response to K was only evident when it was applied together with P and N.

3967. Boock, O. J.
O farelo de torta de algodão na adubação da batatinha. **(Cotton meal as a potato fertilizer.)** [English summary ¼ p.]
Bragantia, 1950, **10**: 329-33, bibl. 5 [received 1952].

In potato fertilizer trials carried out in 5 localities in the state of São Paulo, Brazil, fertilizer mixtures containing equal amounts of superphosphate and potassium sulphate and varying amounts of cotton meal and ammonium sulphate were compared. The results indicated that cotton meal could be used to advantage as a potato fertilizer at the rate of 650 kg. per acre, preferably in mixture with an equal amount of sulphate of ammonia.

3968. Primost, E.
Einjährige Feldversuche mit hohen, geteilten Stickstoffgaben zu Winterweizen und Kartoffeln. **(One year's fertilizer trials with winter wheat and potatoes involving high dosages of nitrogen applied in instalments.)**
Bodenkultur, 1952, **6**: 61-83, bibl. 22.

Before planting the potato plots received one-third of varying amounts of ammonium sulphate and either 400 kg. basic slag + 600 kg. " patent " potassium per ha. or 25 tons stable manure + 200 kg. basic slag. The second N application was made at the time of the first hoeing and the third at the time of earthing up, the total amounts of ammonium sulphate supplied ranging from 250 to 1,000 kg./hectare (=50-200 kg. N). In addition, 200 kg. granulated superphosphate was applied as a top dressing. The underlying idea of this arrangement was partly to delay the availability of P and N until the plant had reached the phase of tuber formation. The tabulated data indicate that with late potatoes an application of 1,000 kg. sulphate of ammonia increased yields by 50% over plots receiving stable manure only, and it is inferred that still greater benefit would accrue from a higher dosage. Another favourable effect of the treatment was an increase in protein content of 37%. Calculations of cost show that the high N applications were a profitable investment. Suggestions are made for modification in the fertilizer programme for early potatoes which did not benefit from the treatment.

3969. Tedin, O., and Gelin, O. E. V.
Kombinerade sort- och mangangödslingsförsök i havre och potatis. **(Manganese fertilizer trials with oat and potato varieties.)** [English summary 1 p.]
J. roy. Swedish Acad. Agric., 1952, **91**: 158-78, bibl. 4, being *Commun. Swedish Seed Ass.* **57**.

Eleven separate trials were carried out at several places to study the effect of a 1% $MnSO_4$ spray applied at the rate of 1,000 l./ha. on 23 potato varieties. As regards yields, the response to the treatment was not consistent, both varietal reactions and the results of replications within a given locality differing considerably. In one trial, for instance, with plants exhibiting distinct deficiency symptoms the average yield increase was 21·6%, with values ranging from 6·6 to 36·1%, while under similar conditions in another trial the average yield increase was only 7·0%. Mn applications were found to have no influence on vitamin C content, on blackening of the tuber after cooking or on brown spot disease, but a small increase in starch content was observed. In 5 trials the average Mn contents of tubers from unsprayed plants (0·47, 0·84, 0·82, 0·92

and 0·62 p.p.m.) were increased in treated plants by 0·62, 0·25, 0·49, 0·35, and 0·44 p.p.m. The data, which are tabulated with English subtitles, are presented without comment as an indication " of the intricate nature of the relations between plant content and effect of nutrient ".

Physiological disorders.

3970. Massey, P. H., Jr., Thompson, H. C., and Smith, O.
Varietal susceptibility of potatoes to internal black spot.
Amer. Potato J., 1952, **29**: 127-35, bibl. 14, being *Pap. Dep. Veg. Crops, Cornell Univ.*, **352**.

A highly significant positive correlation of 0·933 was found between black spot index and specific gravity in 1949, using Long Island-grown Katahdin potatoes, though there are other factors also influencing blackening. Black spot is becoming increasingly prevalent in New York State, but several of the tested varieties reacted differently in blackening susceptibility when grown in different counties. Ontario, however, consistently blackened more than any other variety in nearly all locations, whereas Ashworth, Pontiac and Kennebec were the least subject to discoloration.

3971. Wiant, J. S., Findlen, H., and Kaufman, J.
Effect of temperature on black spot in Long Island and Red River Valley potatoes.
Amer. Potato J., 1951, **28**: 753-65, bibl. 4.

Studies conducted by the U.S. Department of Agriculture show that the incidence and severity of black spot after bruising can be greatly reduced by conditioning potatoes for some days at temperatures higher than the normal storage range. A conditioning temperature range of 65° to 75° F. gave the best results, but in no case was complete control obtained. Continuous storage at temperatures higher than normal was also found to reduce black spot after bruising, but both methods of control should be further investigated. A warning is given against handling black spot susceptible potatoes immediately after release from colder than normal storage.

3972. Boock, O. J., and Costa, A. S.
Rachadura dos tubérculos de batatinha. **(Tuber cracking in potatoes.)** [English summary ¼ p.]
Bragantia, 1950, **10**: 317-19, bibl. 3, illus. [received 1952].

In the state of São Paulo, Brazil, cracking of potato tubers is most prevalent in the crops grown during the " dry season ", i.e. when the rainfall is more abundant at the beginning of the growing period than towards the end. In variety tests carried out in several districts it was found that Katahdin, Green Mountain, White Bliss, Z.P.C.-40405, Eersteling and Saskia showed a high incidence of cracking, whereas Eigenheimer showed little cracking. A negative correlation was found between susceptibility to cracking and a tendency to form secondary growth. Tests to determine whether tuber cracking is a pathological disorder gave negative results.

3973. Naka, J.
Physiological and ecological studies on potato plants. II. Investigations on the secondary growth of potato tubers, especially in relation to soil moisture. III. Investigation on the secondary growth of potato tubers, especially in relation to air components in soil. [Japanese with English summaries ½ and ⅔ p.]
Tech. Bull. Kagawa agric. Coll., 1950, **2**: 1-8, bibl. 6 and 9-12, bibl. 5.

Withholding water from partially ripened potato tubers led to sprouting associated with an increase in reducing sugars. Similar sprout development occurred under conditions of excessive soil moisture. Accumulation of starch in the new sprouts led to the formation of secondary tubers. Decreasing the oxygen content of the soil by either increasing soil moisture or introducing hydrogen depressed the respiration rate of the primary tubers, and secondary growth again resulted. [For part I see *H.A.*, 22: 2762.]

Virus diseases and aphid vectors.

(*See also* 4017d, p.)

3974. Limasset, P.
Le controle sérologique en 1951. **(Serological tests in 1951.)**
Pomme de Terre franç., 1952, **15**: 153: 3-5.

This brief report on work carried out in 1951 at 3 French research stations (Bréhoulon, Précieux and La Pierre Qui Vire) shows that serological tests are gaining in importance as a diagnostic method of virus detection in potatoes. The technique, however, proved unreliable in the case of mosaic, where 23% of diseased plants with leaf symptoms escaped detection by serological methods. Further improvement of the method and consequently more reliable results can be confidently expected.

3975. Roland, G.
Étude virologique sur la pomme de terre. **(A virological study of the potato.)**
C.R. Rech. I.R.S.I.A. **7**, 1952, pp. 118, bibl. 186, illus.

Symptomatological and histopathological research was undertaken on 76 potato varieties from Dutch and Belgian sources. *Virus X:* None of the varieties tested was completely immune. It is therefore recommended that immune varieties should be bred from imported immune varieties such as Craig's Defiance and Crusader. *Virus Y* is rare and non-persistent. *Virus A* is common and difficult to identify. It is desirable that immunity should be a character in all new varieties bred. The hypersensitive varieties, Bintje, Gloria, Ideaal, Meerlander, Record, Saskia and Wilpo, could furnish this character. The characters of hypersensitivity or immunity to Virus X and A are linked with dominant factors and this should greatly facilitate their incorporation in the phenotype of new hybrids. *Masked infection:* In the varieties studied the presence of virus could usually be detected but in some cases infection was masked. These need careful study with a view to elimination, not only because latent infection reduces yields but also because infected plants are more

sensitive to the attack of another virus than healthy ones.

3976. Zeller, A., and Fössleitner-Karl, H.
Virusnachweis durch Formoltitration? **(Is formaldehyde titration a suitable method of differentiating between healthy and virus-diseased potato tubers?)**
Veröff. Bundesanst. alpine Landw. Admont, Hft **6**, 1952, pp. 138-49, bibl. 3.

A repetition of Ekelund's experiments (see *H.A.*, 19: 2203) showed that his biochemical method is not a reliable means of identifying potato varieties or of determining the presence of leaf-roll in the tubers.

3977. Richardson, L. T., and Racicot, H. N.
The comparative efficiency of tuber indexing and tuber unit planting in the elimination of virus diseases from seed potatoes.
Amer. Potato J., 1951, **28**: 765-75, bibl. 15, being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric., Ottawa* **1118**.

While there was no marked difference between the accuracy of the tuber index and the tuber unit methods for detecting virus diseases in seed potatoes in trials conducted at Ottawa, it was apparent that the index method possesses sufficient advantages over the unit method to recommend its use for maintaining pure seed potato stocks.

3978. Hutton, E. M., and Wark, D. C.
A relationship between immunity and localized reaction to virus X in the potato (*Solanum tuberosum*).
Aust. J. sci. Res., Ser. B, biol. Sci., 1952, **5**: 237-43, bibl. 8.

The pattern of virus X development in the inoculated leaves of immune, localized reacting, and susceptible phenotypes in the potato has been studied. The results indicate that immunity is not absolute. Phenotypes giving a localized reaction cannot be regarded as hypersensitive. The evidence shows that an inactivating system restricts the development of the virus as soon as infection takes place. All the results, including those from the X inoculation of first-generation seedlings, raised from intercrosses between immune, localized reacting, and susceptible phenotypes, indicate that a common virus-inactivating system determines resistance. The difference between localized resistance and immunity may be determined by different tetraploid conditions of a common major gene. [Authors' summary.]

3979. Hutton, E. M., and Peak, J. W.
Definition of potato virus Y strains by some solanaceous species.
Aust. J. agric. Res., 1952, **3**: 1-6, bibl. 6, illus.

To find an indicator which would clearly define strain differences among virus Y isolates without the need for complicated experiment several solanaceous species were investigated. Among these *Lycium halimifolium*, *L. rhombifolium*, *Physalis floridana* and *Capsicum annuum* distinguished, by their differing reactions, between the 4 strains Rothamsted (R), 18·2, Victorian Y and virus C, *P. floridana* giving the best differentiation.

3980. Hutton, E. M., and Peak, A. R.
The selection of spotted-wilt-resistant phenotypes in the potato (*Solanum tuberosum*).
Aust. J. agric. Res., 1952, **3**: 137-47, bibl. 7, illus.

Spotted-wilt-resistant and susceptible phenotypes among potato varieties and hybrids are not determined satisfactorily by hand-inoculation of leaves, but can be selected by stem-tip inoculation of vigorously growing plants at the flowering stage with a strain mixture of the virus. This glasshouse method gives a better differentiation than that obtained in field epidemics. Phloroglucinol staining of infected stems indicated that spotted wilt affects the same tissues as virus Y. Studies on the movement of spotted wilt have shown that varieties like Brownell have a high degree of tolerance, and that the tip blight and necrotic strains of a mixture take part in the early stages of systemic infection in susceptible varieties. A high percentage of the hybrids bred by the authors were resistant to spotted wilt. [Authors' summary.]

3981. Kassanis, B.
Some factors affecting the transmission of leaf-roll virus by aphids.
Ann. appl. Biol., 1952, **39**: 157-67, bibl. 13, illus.

Studies in the transmission of potato leaf-roll virus by *Myzus persicae* on *Datura tatula* showed that (1) the infective power of the aphids and its duration were correlated with the length of infective-feeding time, and (2) a shorter infective feeding time was required on younger, more recently infected plants.—Rothamsted exp. Stat.

3982. Münster, J., and Murbach, R.
L'application d'insecticides contre les pucerons vecteurs des viroses de la pomme de terre peut-elle garantir la production de plants de qualité? **(Can insecticidal treatment of the aphid vectors of the potato viruses ensure good plants?)**
Rev. romande Agric. Vitic., 1952, **8**: 41-3.

In experiments near Lausanne in 1951 0·2% tetradimethylaminopyrophosphoric ester was applied to Bintje potatoes at 1,000-1,500 l. per ha. according to the size of the plants, every 2, 3 and 4 weeks during June and July. Treatments reduced infestation very greatly but apparently did not prevent invasion by winged aphids or the development of wingless colonies.

3983. Anon.
Le problème des pucerons. **(Potato aphids.)**
Pomme de Terre franç., 1952, **25**: 151: 11-18, bibl. 31.

Discusses the significance of 7 aphid species as virus vectors and methods of aphid control in potatoes.

3984. Henner, J., and Schreier, O.
Untersuchungen über das Auftreten von Blattläusen an Kartoffeln in Österreich in den Jahren 1950-1951 im Zusammenhang mit virösem Kartoffelabbau. **(Investigations on aphid incidence on potatoes in Austria in 1950-51 in connection with potato virus diseases.)** [English summary ⅓ p.]
PflSch. Ber. Wien, 1952, **8**: 150-9, bibl. 9.

For the purpose of defining seed potato producing areas in Austria the varieties Ackersegen and Allerfrüheste Gelbe were examined for aphid infestation in 1950 and 1951 at 11 centres. The infestation was on the whole mild in both years, *Myzus persicae* predominating. A correlation was established between virus infection and aphid infestation. Local conditions influenced on the intensity of aphid attack.

3985. Völk, J., Bode, O., and Hauschild, I.
Untersuchungen zur Frage eines Zusammenhanges zwischen Düngung, Blattlausbesatz und Krankheitsausbreitung in Kartoffelbeständen. I. Mitteilung. **(The correlation between manuring, aphis population and disease distribution in potato plots. Part I.)**
Z. PflKrankh., 1952, **59**: 97-110, bibl. 10.

Further field trials confirm that the susceptibility of potato plants to the leaf roll virus increases with the use of KCl fertilizer. There was no positive correlation between the density of *Myzus persicae* populations and leaf roll susceptibility. Plots to which KCl was the only fertilizer applied showed particularly low aphid populations as well as high leaf roll susceptibility. It is assumed that the KCl manuring changes the reaction of plants in a way which is favourable to the reception of the virus.

3986. Klapp, E.
Zusammenhang düngungs-und bodenbedingter Standortsunterschiede mit Pfirsichblattlausbesatz und Nachbauwert der Kartoffel. **(Connexion of different environmental factors due to fertilizer and soil with infection by peach aphid, and quality of the potato crop.)**
Z. Acker- u. PflBau., 1951, **93**: 347-58, from abstr. in *Soils and Ferts*, 1952, **15**, No. 1090.

K-deficient plants are more prone to infection than plants fertilized with K, but owing to their shorter life the virus disease has less time to take effect whilst physiological factors may hinder the spread of the virus in the plant. Greater yields have therefore been associated with K deficiency, although in the absence of infestation and of excess Cl, K improves yields. Excess of Cl and to a smaller extent of Na produces pathological symptoms; K_2SO_4 is preferable to KCl. Narrow spacing of the plants with P only gives higher yields than wide spacing with unfavourable NK manuring, even when the narrowly spaced plants are more heavily infested with aphids.

3987. Arenz, B.
Der Einfluss verschiedener Faktoren auf die Resistenz der Kartoffel gegen die Pfirsichblattlaus. **(The effect of various factors on the resistance of the potato to aphids.)**
Z. PflBau. PflSchutz., 1951, **2**: 49-67, from abstr. in *Soils and Ferts*, 1952, **15**, No. 1124.

Aphid populations introduced on healthy potato plants almost died out where no fertilizer had been supplied increased very markedly on adequately fertilized plants and decreased considerably on N-deficient plants. Populations introduced on leaf-roll-diseased plants increased at a higher rate than on healthy plants. On the latter with NPK the final population after 4 weeks was 2·99 times its original size. Corresponding increases on diseased plants were 5·72 without fertilizer, 5·62 with PK and 7·45 with NPK.

Bacterial diseases.

(*See also* 4017h, n.)

3988. Richardson, J. K.
The influence of tuber development on scab infection in Katahdin potatoes.
Phytopathology, 1952, **42**: 297-8, bibl. 2, illus., being *Contr. Div. Bot. Plant Path. Sci. Serv., Dep. Agric., Ottawa* **1124.**

Katahdin potatoes were chosen for this test because they are very susceptible to common scab [*Actinomyces scabies*] and are widely distributed in Ontario. Plants with tubers of various sizes were transplanted from sterilized soil to heavily scab-infected soil. Tubers produced in contaminated soil and those which increased in size after transplanting developed typical scab lesions. Infection on transplanted tubers occurred only in the area of enlargement and its severity varied directly with tuber growth.

3989. Hooker, W. J., and Sherf, A. F.
How to control potato scab.
Ia Fm Sci., 1951, **5**: 108-9, illus.

Sulphur applications varying from 1,000 to 6,000 lb. per acre are shown to control potato scab on peat soils in Iowa. Lower rates of 500-1,000 lb. per acre should, however, be tried first, experimentally, as overdosing is undesirable. Mineral soils generally require lighter treatments.

3990. Černyšova, O. P.
The effect of calcium carbonate on the activity of *Actinomyces scabies*, organism of common potato scab. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **81**: 473-5, bibl. 1.

Cultures of *Actinomyces scabies* grew and multiplied faster when $CaCO_3$ was added to the various growth media. Potatoes grown on land treated with $CaCO_3$ had a higher incidence of scab infection than those grown on similar soils without $CaCO_3$, but soil pH had no direct influence on the organism.

Fungous diseases.

(*See also* 4017j, k, l, r.)

3991. Stevenson, F. J., and others.
Late blight immunity in potatoes.
Phytopathology, 1952, **42**: 277-80, bibl. 11.

The difficulties encountered in breeding potatoes for immunity to late blight (*Phytophthora infestans*) are pointed out, and the progress made is indicated. Varieties with an intermediate degree of resistance to late blight and others apparently immune to the common physiologic races have been released to growers. Those varieties immune to the common races have maintained their resistance under a wide range of environmental conditions in most of the potato-growing sections of the United States. Several species of *Solanum* are immune to late blight but most information has been obtained about *S. demissum*, because it is easily crossed and back-crossed to varieties of *S. tuberosum*. Some of the seedling varieties are immune

to one or more of the virulent races after 5 back-crosses to cultivated sorts; such varieties have been produced in the United States; others have been imported from Canada, Germany, and Scotland.

3992. SCHULTZ, E. S.
Powdery scab, a precursor for the late blight infection of blight-immune potato tubers.
From abstr. in *Phytopathology*, 1952, **42**: 343.

In Maine during the 1951 epiphytotic of late blight (*Phytophthora infestans*) blight-immune Kennebec potato tubers contracted late blight in soil infected with the powdery scab organism, *Spongospora subterranea*. In a blighted field at harvest about 30% of the scabbed tubers were infected with late blight, whereas no scab-free tubers were infected.

3993. VASUDEVA, R. S., AND AZAD, R. N.
Efficacy of certain fungicides against potato late blight and assessment of loss due to the disease.
Amer. Potato J., 1952, **29**: 61-71, bibl. 5.

Results of experiments in the Simla Hills, India, have shown burgundy mixture and perenox to be the most effective of the materials tested for the control of potato late blight, *Phytophthora infestans*, resulting in yield increases of 139·5 and 71·4% respectively. While no absolute correlation between the ultimate loss of leaf area destroyed by the disease and tuber yield was obtained, it appears that yield decreases with increase in loss of leaf area. It was further shown that the rate at which the disease progresses and the total period during which the foliage remains green as a result of fungicidal protection greatly influence the yield.

3994. CHATTOPADHAYAY, S. B.
Control of late blight of potato in the hills of Darjeeling district, West Bengal.
Sci. and Cult., 1952, **17**: 379-80, bibl. 2.

Under conditions of high relative humidity and low maximum temperatures in the Darjeeling district, bordeaux mixture tends to be phytotoxic to potatoes and proprietary copper fungicides have too low tenacity. In trials over the past 3 years the carbamates, Dithane-D-14 and Dithane-Z-78, especially the former, have successfully controlled blight (*Phytophthora infestans*) when applied at intervals of 7 to 14 days depending on the weather.

3995. CHATTOPADHAYAY, S. B.
Application of "Perenox" for control of blight diseases of potato in West Bengal, India.
Plant Prot. Overs. Rev., 1951, **2**: 3: 12-16, illus.

In West Bengal potatoes suffer from early blight (*Alternaria solani*) in the plains and late blight (*Phytophthora infestans*) in the Himalayan region. Early blight was found to be controllable by a perenox spray at 2½-3 lb. per 100 gal. of water when the plants are 8-10 in. high followed by a second spray at 4-4½ lb. 3-4 weeks later, and occasionally by a third if the attack is particularly severe. The control of late blight in the exceptionally difficult climatic conditions of the Himalayas involved spraying with perenox at 6-7 or more lb. per 100 gal. of water every 7-10 days.

3996. GASSNER, G., AND GRIMM, H.
Über die Wirkung von Kupferkalkspritzungen auf Ertrag und Stärkegehalt der Kartoffeln. **(The effect of spraying with bordeaux mixture on yield and starch content of potatoes.)**
Angew. Bot., 1952, **26**: 60-8, bibl. 9.

Potato plots were sprayed 4 times with 1% bordeaux mixture at the rate of 600 litre/hectare, and tuber yield per plant, starch content of the dry matter and starch yield per plant were repeatedly determined during the season. In healthy sprayed plants the values obtained were usually lower than those for unsprayed plants or at best equal to them, and a stimulating effect of the treatment was not observed, except in early potatoes which had a higher starch content up to July. After the onset of *Phytophthora* infection tuber development in the control plots was adversely affected, while tuber yield, starch content and starch yield increased normally in the sprayed plots. As copper sprays were shown to be phytotoxic even at low concentrations, preventive applications before the appearance of the first blight symptoms are discouraged.

3997. FOISTER, C. E., WILSON, A. R., AND BOYD, A. E. W.
Dry-rot disease of the potato. I. Effect of commercial handling methods on the incidence of the disease.
Ann. appl. Biol., 1952, **39**: 29-37, bibl. 12.

Experiments with Doon Star and Arran Pilot showed that wound infection accounts for all but a negligible proportion of the dry-rot disease, caused by *Fusarium caeruleum*, under commercial conditions.

3998. MCKEE, R. K.
Dry-rot disease of the potato. II. Fungi causing dry rot of seed potatoes in Britain.
Ann. appl. Biol., 1952, **39**: 38-43, bibl. 10.

Examinations of seed potatoes of various species under the auspices of the Agricultural Research Council's Potato Storage Investigation showed the presence of parasitic fusaria in 91% of the lesions. 93% of these were *F. caeruleum*.

3999. GUILLEMAT, J., LELIÈVRE, D., AND MONTÉGUT, J.
Essais de fongicides contre la fusariose de la pomme de terre. **(Fungicide trials for the control of dry rot in potatoes.)**
Pomme de Terre franç., 1952, **15**: 152: 2-9, illus.

The experiments were carried out in the laboratory on potato tubers artificially infected with *Fusarium caeruleum*. Various fungicides applied as dusts or in solution, among them Phygon XL, Fusarex and Dithane Dz 78, were found to afford a degree of protection which should prove satisfactory under field conditions without being phytotoxic. Data are tabulated on fungistatic action, on the depth of mycelial penetration into the tuber and on the effect of treatments on sprouting.

4000. WENZL, H., AND DEMEL, J.
Untersuchungen über den Pflanzgutwert fadenkeimiger Kartoffelknollen. **(The effect of hair sprout on tuber yield in potatoes.)**
Bodenkultur, 1952, **6**: 41-54, bibl. 38, illus.

In the hot, dry climate of eastern Austria hair sprout, as well as virus infection, has a considerable share in potato degeneration. Yields from affected tubers were found to be 10-40% less than those from healthy tubers, the yield per plant being closely related to the severity of the symptoms exhibited by the seed potato. Tubers harvested from diseased seed potatoes did not show any greater tendency to develop hair sprout than did healthy controls, which rules out virus infection as the cause of the trouble. In areas where the malady is common a crop produced from affected tubers often has an even smaller incidence of hair sprout than a crop from healthy tubers. The explanation offered for this observation is that the diseased plants develop slowly and thus escape *Colletotrichum* wilt and related diseases to which, it is believed, hair sprout is due.

4001. KEYWORTH, W. G.
Verticillium wilt of potatoes in Connecticut, 1951.
Plant Dis. Reptr, 1952, **36**: 16-17, bibl. 3.
This is a further note on outbreaks of verticillium wilt in Connecticut potato fields. Fairly severe symptoms were noted on the Katahdin and Green Mountain varieties but the comparatively new variety Kennebec was most severely affected.

Nematodes.

(*See also* 4017m.)

4002. LEAR, B., AND OTHERS.
Soil fumigation experiments on Long Island, New York, to control golden nematode of potatoes.
Phytopathology, 1952, **42**: 193-6, bibl. 5, illus.
At equal dosages (450 lb. per acre) a mixture of dichlorobutenes was the most effective of the preparations tested against *Heterodera rostochiensis*. D-D was almost as effective: when applied in split dosages, 225 lb. followed by 450 lb. 11 days later, it reduced viable nematodes from 13,000 per sq. ft. to seven.—Cornell University, Ithaca, N.Y.

4003. HASTINGS, R. J., BOSHER, J. E., AND NEWTON, W.
Experimental transfers of the bulb nematode of iris, of narcissus, and of hyacinth to potato.
Sci. Agric., 1952, **32**: 304-10, bibl. 7.
The widely distributed iris bulb nematode, *Ditylenchus dipsaci*, is indistinguishable from and may, according to recent evidence, be identical with the potato rot nematode, *D. destructor*, which hitherto has been reported only from 2 places in North America. First- and second-stage larvae of the iris nematode will enter, and complete their life cycle, in potato tubers. Larvae of the narcissus bulb nematode will also enter potato tubers, but they fail to complete their life cycle in them. Larvae of the hyacinth bulb nematode enter only potato tubers that are injured, and they likewise fail to complete their life cycle in them. The presence of gravid females, eggs and larvae in a host is not conclusive evidence of true nematode parasitism, for gravid females will lay eggs in tap-water and these eggs will hatch there over a period of 21 days. Transfers to potatoes are satisfactorily effected when wads of wet cotton wool containing active larvae of a single stage are placed on the tubers.—Dom. Lab. of Plant Path., Saanichton, B.C.

Insect pests.

(*See also* 4017e, q.)

4004. KRISHNAMURTI, B.
The potato beetle and its control by its natural enemy.
Mysore agric. Calendar, 1949, pp. 33-4, illus. [received 1952].
A simple method is described and illustrated whereby potato growers may rear and release the wasp, *Pleurotropis foveolatus*, which parasitizes the grubs of the potato beetle, *Epilachna 28-punctata*.

4005. KEILBACH, R.
Chrysopidenlarven—als gelegentliche Vertilger von Kartoffelkäfereiern. **(Chrysopid larvae as occasional predators of colorado beetle eggs.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1952, **6**: 14, illus.
Larvae of *Chrysopa vulgaris*, known to be predators of aphids, were found destroying colorado beetle eggs at the Halle Zoological Institute.

4006. SMITH, W. A.
Potato tuber moth control in North Queensland.
Qd agric. J., 1952, **74**: 22-4.
Losses due to *Gnorimoschema operculella* in potatoes in north Queensland are most noticeable in the form of damaged tubers at harvesting time, but in late planted crops leaf damage can be intense enough to reduce tuber growth. The seasonal history of the moth and its control in the field are described. DDT, efficiently applied, preferably as a spray, will protect the haulm, but this treatment should be supplemented by hilling. DDT applications should start soon after the moths are first noticed in the field, using one pound per acre at each treatment. As tubers are bagged in the field they should be treated with 2% DDT dust at the rate of ½ lb. per bag.

4007. KIRK, V. M.
A study of the disposition of DDT when used as an insecticide for potatoes.
Mem. Cornell agric. Exp. Stat. **312**, 1952, pp. 48, bibl. 59.
Tests were made weekly during 1949 and 1950 to obtain an over-all picture of the disposition of DDT from seasonal spray applications to potato vines. It was found that 39-40% of the DDT sprayed at recommended rates went directly through the vines to the soil. By correcting losses of deposits due to growth, it was further found that the deposits from both DDT emulsion and wettable powder were reduced by 90-93% during a 7-day exposure period. This loss was due to the combined effects of sunlight, wind and rainfall. The reduction of deposit due to sunlight alone was greater from emulsion than from wettable powder, while wettable powder residues were more liable to be

washed off by rain than the emulsion residues. The fate of DDT which reached the soil was also studied.

Storage.

4008. MARAIS, J. G.
The storage of potatoes on the farm.
Frng S. Afr., 1952, **27**: 271-2, 280, illus.

Instructions supported by illustrations are given for the construction of a conventional potato clamp made in a trench 12 in. deep, and of a clamp built up on the soil surface between rows of hay bales. On the Highveld winter nights are cold, but owing to high day temperatures it has been found desirable to place both types of clamp under the shade of trees and to ensure that ventilation is adequate during the first fortnight, but not excessive thereafter.

4009. SMITH, W. L., JR.
Effect of storage temperatures, injury and exposure on weight loss and surface discoloration of new potatoes.
Amer. Potato J., 1952, **29**: 55-61, bibl. 10.

Data obtained in experiments with Irish Cobbler show that new potatoes stored at 40° F. lost more weight and browned more severely when transferred to higher temperatures than potatoes kept constantly at higher temperatures. It is also apparent that, if temperature and humidity are favourable for the formation of protective layers in injured areas, loss in weight and surface browning are reduced.

4010. SMITH, W. L., JR.
Decay of nonheated and heat-injured potatoes as influenced by storage temperature.
From abstr. in *Phytopathology*, 1952, **42**: 344.

The experiments mentioned indicate that conditioning tubers at 60° or 70° F. materially reduces decay at high temperatures, but that less reduction occurs at the same high temperature if they are conditioned at 40° or 50° F.

4011. NYS, L.
L'étuvage et l'ensilage des tubercules.
(The steaming and ensilage of potatoes.)
Bull. Inst. agron. Gembloux, 1951, **19**: 327-63.

The basic preliminary research described was undertaken because of the increasing importance of the steaming and ensilage of potatoes as a safe means of storing them for fodder and to provide a basis for further research. By this method most of the loss sustained in ordinary storage is avoided. Loss of water and dry matter occurs but leaching can be minimized by close adherence to the proper technique and good fermentation can be obtained without difficulty. The starch value remains almost unchanged but there is some reduction in food value, and 1·355 kg. must be put in the silo to obtain a yield of 1 kg. Good results depend on the cleanness of the potatoes, the use of a silo with a suitable cross section, the correct degree of cooking, the total absence of air from the heap and the free drainage of the condensed steam.

Quality and composition.
(See also 4017L.)

4012. COBB, J. S.
Potato quality associated with variety and maturity.
Science for the Farmer, being *Suppl. No. 3 to the 64th A.R. Pa agric. Exp. Stat. for the year ending June 1951*, 1952, pp. 9-10, illus.

The author discusses potato quality as affected by variety and environmental factors. With most varieties tubers with a specific gravity of 1·085 or higher are quite mealy, those with S.G. of 1·085 to 1·075 are fairly good boiling potatoes, and those with S.G. below 1·075 are not very suitable for boiling and are best for frying or salads.

4013. LEICHSENRING, J. M., AND OTHERS.
Factors influencing the nutritive value of potatoes.
Tech. Bull. Minn. agric. Exp. Stat. **196**, 1951, pp. 96, bibl. 80.

The results of cooperative research by 11 agricultural experiment stations and the U.S. Department of Agriculture are summarized. 1. Potato varieties vary significantly in reduced and dehydroascorbic acid, thiamine, calcium, phosphorus, and iron contents. The initial dehydroascorbic acid content constitutes a fairly uniform proportion of the total ascorbic acid in all varieties studied. The peel is low in reduced ascorbic acid as compared with the potato tissue. 2. Significant differences in nutrient content attributable to locality are evident. 3. Potatoes of the same variety produced in the same locality vary significantly in reduced ascorbic acid content with crop year. 4. Immature tubers are higher than mature tubers in ascorbic acid, maximum content being attained when the vines have reached full growth and before any of the older leaves have begun to die. 5. Storage results in a decrease in reduced ascorbic acid, the rate of loss varying with variety. Losses are rapid in the early storage period and more gradual in later months. The content in spring is one third or less of that observed at time of harvest. Thiamine content appears to increase slightly with continued storage. 6. Losses in reduced and total ascorbic acid attributable to storage increase as the temperature of storage decreases. The length of the storage period appears to be a factor in this connection. Potatoes stored for 12 weeks showed best retention at 68° F., whereas potatoes stored for seven months showed best retention at 50° F. Dehydroascorbic acid content tended to increase with the lower storage temperatures. 7. Storage at room temperature following a period of storage at lower temperatures results in an apparent increase in the reduced and total ascorbic acid contents of potatoes, the amount of the increase varying inversely with the initial storage temperature. There is a tendency for the dehydroascorbic acid content to decrease under the same conditions. 8. Potato varieties high in reduced ascorbic acid content tend to produce progeny which are medium to high in this factor, and varieties low in this nutrient tend to produce progeny with medium to low values. 9. There appears to be no relationship between reduced ascorbic acid content and resistance to common potato diseases or between reduced ascorbic acid content and certain

physical characteristics. 10. Losses in reduced ascorbic acid vary with the cooking method employed. [From authors' summary.]

4014. TAGAWA, T., AND OMORI, H.
Physiological and morphological studies on potato plants. VI. On the osmotic pressure in varied organs of potato plants at various stages of growth. [Japanese with English summary ⅔ p.]
Tech. Bull. Kagawa agric. Coll., 1951, **2**: 144-8, bibl. 10.

Seasonal variations in osmotic pressure in various organs of potato plants were recorded throughout their complete growth cycle. In mother tubers osmotic pressure was high during sprouting but declined slowly. Pressure was high in newly developing tubers and low in roots compared with other organs. Pressure was high in stalks and fairly high in leaves and stolons in the early stages but declined as the new tubers developed and matured. Studies on plants treated with indoleacetic acid confirmed the previous conclusion that IAA not only accelerates decomposition of starch in the mother tuber but hastens starch deposition in the new tubers.

4015. HACKETT, D. P.
The osmotic change during auxin-induced water uptake by potato tissue.
Plant Physiol., 1952, **27**: 279-84, bibl. 12.

Although previous workers have reported that auxin lowers the osmotic concentration of the cell sap of potato tuber tissue, these effects have been rather small. Under new experimental conditions, a very large auxin-induced water uptake by potato disks has been obtained. Correspondingly, it has been shown that the auxin causes a large and clear decrease in the osmotic concentration (determined cryoscopically) of the expressed sap. This decrease can be accounted for by the increase in volume. It is concluded that auxin-induced water uptake, or growth, cannot be primarily the result of the formation of additional osmotically active substances in the cell. [Author's summary.]—Harvard Univ., Cambridge, Mass.

4016. PAYNE, M. G., FULTS, J. L., AND HAY, R. J.
The effect of 2,4-D treatment on free amino acids in potato tubers.
Amer. Potato J., 1952, **29**: 142-50, bibl. 26, illus., being *Pap. Sci. Ser. Colo. agric. Exp. Stat.* **360**.

Treatment of Red McClure potato plants with low concentrations of the sodium salt of 2,4-D results in an increase of free glutamic acid and a decrease of 11 other amino acids. Possible mechanisms of 2,4-D action have been discussed in relation to these facts. [Authors' summary.] [For note in *Science*, see *H.A.*, 22: 1669.]

Noted.

4017.

a ANON.
Nouvelles variétés françaises inscrites au catalogue. **(New French potato varieties entered in the register.)**
Pomme de Terre franç., 1952, **15**: 151: 24.

b CAMPBELL, J. C. (Editor).
American potato yearbook 1952
319 Scotch Plains Avenue, Westfield, N.J., 1952, pp. 80, $2.00.

c DEPARTMENT OF AGRICULTURE, DUBLIN.
Field experiments, 1949.
J. Dep. Agric. Dublin, 1950, **47**: 132-70 [received 1952].
Includes tabulated data from early and maincrop potato variety trials.

d GREENHAM, C. G., AND OTHERS.
Some electrical differences between healthy and virus-infected potato tubers.
Nature, 1952, **169**: 973-4, bibl. 3.
Data for virus X and leaf roll from the Divisions of Plant Industry and of Electrotechnology, C.S.I.R.O., Aust.

e GRISON, —., AND LE BERRE, —.
Études écologiques poursuivies en 1951 sur le doryphore. **(Ecological studies of the colorado beetle in 1951.)**
Pomme de Terre franç., 1952, **15**: 154: 3-6.

f JÄHNL, G.
Die Wuchsstoffe in der Kartoffelknolle. (Eine Übersicht.) **(The growth hormones of the potato tuber. A survey.)**
Veröff. Bundesanst. alpine Landw. Admont, Hft **4**, 1951, pp. 1-11, bibl. 21.

g JEHLE, R. A.
A machine for planting potatoes in tuber units.
Amer. Potato J., 1952, **29**: 141.

h JOHNSON, G., AND SCHAAL, L. A.
Relation of chlorogenic acid to scab resistance in potatoes.
Science, 1952, **115**: 627-9, bibl. 10, illus., being *Sci. J. Ser. Art. Colo. agric. Exp. Stat.* **374**.

i KIRKPATRICK, M. E., AND OTHERS.
Cooking quality, specific gravity, and reducing-sugar content of early-crop potatoes.
Circ. U.S. Dep. Agric. **872**, 1951, pp. 22.

j MCKEE, R. K., AND BOYD, A. E. W.
Dry-rot disease of the potato. III. A biological method of assessing soil infectivity.
Ann. appl. Biol., 1952, **39**: 44-53, bibl. 11.
Fusarium spp.

k MINISTRY OF AGRICULTURE, LONDON.
Common scab of the potato.
Adv. Leafl. Minist. Agric. Lond. **5**, 1952, pp. 4, illus., 2d.

l MINISTRY OF AGRICULTURE, LONDON.
Sclerotinia disease of potatoes and other plants.
Adv. Leafl. Minist. Agric. Lond. **265**, 1952, pp. 4, illus., 2d.

m MINISTRY OF AGRICULTURE, LONDON.
Potato root eelworm.
Adv. Leafl. Minist. Agric. Lond. **284**, 1952, pp. 6, illus., 2d.

n PATEL, M. K., KULKARNI, N. B., AND KULKARNI, Y. S.
Ring disease of potato in India.
Curr. Sci., 1952, **21**: 47-8, bibl. 3.
Confirmation that *Phytobacterium solanacearum* is responsible.

o PRATT, A. J.
Northeastern potato growers irrigate.
Market Grs' J., 1952, **81**: 5: 18-19, illus.
Successfully in N. York State.

p ŚWIEŻYŃSKI, K.
A simplified serological test for the determination of virus X in potato plants.
Acta. Soc. Bot. Polon., 1950, **20**: 513-21, from abstr. in *Rev. appl. Mycol.*, 1952, **31**: 254.
A simple, rapid and reliable field technique.

q THOMAS, I., AND AITKENHEAD, P.
Colorado beetle in England, 1951.
Agriculture, Lond., 1952, **59**: 129-33.
Details of the comparatively few outbreaks in 1951.

r WEBSTER, J. G., AND DAWSON, J. A.
A polarographic method for the estimation of tetrachloronitrobenzene residues on potatoes.
Analyst, 1952, **77**: 203-5, bibl. 1.
Used as fungicide and sprout depressant on stored potatoes.

TOBACCO.

General.

(*See also* 4067a, b, c, 4305, 4520, 4528, 4531, 4534, 4548, 4556.)

4018. RETIEF, D. F.
Tobacco farming in South Africa.
Fmg S. Afr., 1952, **27**: 199-200, 215.
This brief historical account of the South African tobacco industry includes mention of the great change in types of tobacco over the past 30 years, the development of cooperative marketing and a note on the economics of tobacco farming.

4019. HILL, A. V.
The tobacco industry in Australia.
Econ. Bot., 1952, **6**: 151-9, bibl. 7.
In Australia tobacco is a minor agricultural crop mainly because of unfavourable climatic conditions and consequent lack of stability. Irrigation as a supplement to rainfall has helped to maintain production in areas where the summer rainfall is low and the soil suitable, and in recent years very good results have been obtained in the dry, north-eastern regions. An immediate limited expansion of the industry, at present producing about 4,000,000 lb. of leaf, is envisaged, provided materials and manpower are available. Further substantial increases would be possible only if water for irrigation were provided in suitable areas.

4020. ATTYGALLE, A. B.
The tobacco industry in the Island [of Ceylon].
Trop. Agriculturist, 1951, **107**: 154-60.
Although tobacco has been grown in Ceylon for at least 300 years it is only within the past 5 years that much progress has been made in the development of cigarette tobacco. This short account of the present position of the industry is mainly concerned with the economics of producing cigarette tobacco and mild cigar tobacco.

4021. TANDON, P. L., AND RAO, P. S.
Cigarette tobacco growing in India.
Indian Tobacco, 1952, **2**: 13-20.
Cultural and flue-curing techniques and the uses of Virginia leaf and scrap are described.

4022. PATEL, M. S., AND NAIR, K. P. S.
Tobacco in Orissa.
Indian Tobacco, 1952, **2**: 35-41.
Tobacco growing and manufacture in Orissa are described. The chief types are chewing (90% of production) and cheroot tobacco.

4023. ROSSI, U., ISALIA, B., AND CARACCIOLO, C.
La coltura e l'industria del tabacco in Italia. Rapporto nazionale al congresso mondiale del tabacco in Amsterdam. **(Tobacco growing and processing in Italy. National report to the world tobacco congress in Amsterdam.)**
Tabacco, 1951, **55**: 343-406, illus.
The report has sections on the history and location of the industry in Italy, the varieties grown, their diseases, scientific research, and organization of the industry in all its aspects.

4024. THAMS, J. C., AND ZENONE, E.
Über Sonnenscheindauer und Globalstrahlung auf der Magadinoebene unter besonderer Berücksichtigung des Tabakanbaues. **(Sunshine and global radiation on the Magadino plain with special reference to tobacco growing.)** [French summary ½ p.]
Landw. Jb. Schweiz, 1952, **1**(n.s.): 139-80, bibl. 8, illus.
The climate and topography of the plain of Magadino, Swiss Tyrol, are described in considerable detail with special attention to insolation and types of soil. On this basis recommendations are made as to the most suitable sites for tobacco growing in the area.

4025. TURCOT, C.
Problème et solution des gelées dans la culture du tabac jaune. **(The problem of frost in tobacco culture and its solution.)**
Rev. d'Oka, 1952, **26**: 41-5.
In Quebec Province white frosts at harvest time are a danger to tobacco crops. A description is given of the successful protection of a 16-acre farm by the use of 24 small paraffin stoves per acre. Costs are quoted.

4026. SCHWARTZ, D., AND CUZIN, J.
Metodo pratico di studio quantitative della crescita del tabacco in campo—crescita comparata di due piantagioni. **(A practical method of the quantitative study of the growth of tobacco in the field. Growth in two plantations compared.)**
Tabacco, 1952, **56**: 86-94.
A method is described whereby the state of growth of a stand of tobacco plants at any given moment can be measured and its changes in course of time recorded. It

permits of the separation of the effects of factors inherent in the plant from those due to environment, so that the real effect of manuring *per se* throughout the course of growth can be traced.

4027. Patel, M. S.
Production and utilisation of tobacco seed oil and cake.
Indian Tobacco, 1952, **2**: 25-32, bibl. 7.

The development of the production of Virginia tobacco seed oil and cake in Madras for commercial purposes since 1949-50 is described. The seed yield per acre is 125-140 lb. and its oil content is 35-42%. The cake (3½% N content) is used as cattle feed and manure.

Breeding and varieties.

4028. Alcaraz Mira, E., and Izquierdo Tamayo, A.
La tetraploidia inducida por la colchicina en el genero *Nicotiana*. **(Tetraploidy induced by colchicine in *Nicotiana*.)** [English summary ½ p.]
Genet. Iber., 1950, **2**: 295-322, bibl. 21, illus. [received 1952].

Tetraploid plants of *Nicotiana rustica* var. Hemelowka and *N. tabacum* var. Hybrid 196-A (Valencia × Round Tip) were produced at Seville Tobacco Biology Institute by the treatment of seeds with 2-5% solutions of colchicine. They displayed gigantism of stomata, flowers, anthers, stigmas and of cells in general. Their fertility was low and the seeds produced were abnormally large and dark and yielded tetraploid offspring. Four generations of these were studied. Fertility was raised by selection and was comparatively stable in F_4. The nicotine content of *N. rustica* tetraploids (6·35%) was much higher than that of diploids (3·75%).

4029. Alcaraz Mira, E., and Caridad Igelmo, J. M.
Trabajos geneticos para la obtención de razas de tabaco mejorando la combustibilidad. **(Genetical experiments in the production of better burning varieties of tobacco.)** [English summary ¾ p.]
Genet. Iber., 1950, **2**: 217-31 [received 1952].

Valencia and Maryland, the varieties chiefly cultivated in Spain, do not show high average combustibility. Breeding experiments carried out at the Tobacco Biology Institute, Seville, with these and other varieties, especially Hybrid 20 (Havana type) and Mammoth Gold, have yielded strains with much better burning qualities.

4030. Perucci, E.
Per ottenere una buona produzione di tabacchi da fascia. Azione agronomica e genetica. **(Good yields of wrapper tobaccos through agronomic and genetic work.)**
Tabacco, 1951, **55**: 285-98, illus.

Early difficulties in the growing of wrapper tobacco leaves of the right type in Italy have been overcome by field experiments and breeding. Growing under cheese cloth has not been successful but current experiments with a much finer net are promising. The early hybrids Sumatra 24 and 44 yield a high proportion of good wrapper leaf when grown under natural or auto-shade methods. In the former, 2 rows of tobacco 60 cm. apart with plants 30 cm. apart are grown between lines of millet or maize 180 cm. apart and orientated in a north-south direction. In the latter plant spacing is reduced to 65 by 30 cm. in mechanized or animal cultivated farms and to 60 by 30 cm. in hand-cultivated farms. The high-yielding, early-maturing, Italian-bred Sumatra 44 (Sumatra × Perustitza gigante) is a good producer of wrapper tobacco of Havana cigar type; the cylindrical habit, short internodes and horizontal insertion of the leaves reduce the ill effects of the sun to a minimum.

Manuring.

4031. Anon.
A summary of the results of fertilizer trials conducted in 1950/51 by the Department of Agriculture.
Nyasaland agric. quart. J., 1951, **10**: 72-4.

Experiments on tobacco and maize are summarized. With the former the results confirmed that N is of greater significance than either P or K. A dressing of 100 lb. sulphate of ammonia per acre at establishment was economically sound and no improvement resulted from doubling the quantity or splitting the application, giving half the N three or six weeks after establishment. Responses to P occurred only at the Central Research Station.

4032. Marais, J. S. C., and Stein, L. H.
Fertilizer studies with tobacco plants using radio-phosphorus labelled superphosphate.
Sci. Bull. Dep. Agric. S. Afr. **331**, 1951, bibl. 3.

A replicated, randomized, 2-level experiment designed to study the uptake of superphosphate by the tobacco plant was conducted at the Central Tobacco Research Station, Kroondal, in 1950, using superphosphate labelled with P^{32}. The total uptake of fertilizer phosphate was at first influenced by the quantity applied but later fell to a constant which was independent of the amount applied. From these results it is considered possible that, if successive applications of smaller quantities of fertilizer were made, there would be a continuously higher total uptake of phosphate.

4033. Komatsu, N.
The phosphorus compounds of tobacco leaves.
J. Sci. Soil Man. Japan, 1951, **22**: 19-22, from abstr. in *Soils and Ferts*, 1952, **15**, No. 1136.

With increased application of P the total inorganic P in the leaves increased, the total N and protein decreased, nicotine showed no variation and the amount of sugar and starch increased.

4034. Krishnamurty, T., and Kadam, B. S.
Tobacco stem-dust—a manure for tobacco.
Indian Tobacco, 1952, **2**: 21-4.

In randomized experiments at Anand Research Station applications of the waste product, bidi tobacco stem-dust, at nil, 3,000 lb. (=48 lb. N) and 6,000 lb. per acre were made in addition to a basic treatment of

1,000 lb. groundnut cake. The smaller stem-dust application delayed maturation slightly and increased yield by 36% over the basal groundnut cake treatment. The larger delayed maturation still further, the tobacco plants having to be harvested before full development of spangles as the leaves began to dry owing to excessive heat, and yield was raised only slightly over that of the smaller application.

4035. Magee, A. I., and Scott, W. A.
A tractor mounted meter attachment for side band application of fertilizer to tobacco plots.
Sci. Agric., 1951, **31**: 454-6, bibl. 1, illus.

A special machine was required for side band applications of fertilizer to burley tobacco experimental plots. A belt-type, walking-fertilizer distributor was modified to operate in conjunction with the drive mechanism of the commercial fertilizer attachment for a single-row tractor cultivator. Tests have shown the flexibility and usefulness of this machine.

Control of flowering and suckering.

4036. Ciferri, R.
Inibizione della fioritura del tabacco da parte dell'idrazide maleica. **(Inhibition of flowering of tobacco by maleic hydrazide.)** [English summary 9 lines.]
Tabacco, 1951, **55**: 307-11, bibl. 15.

In experimental spraying of Virginia Bright tobacco with maleic hydrazide flowering was delayed for an average of 7·3 days at a concentration of 100 p.p.m., for 8·7 days at 200 p.p.m., for 10·7 days at 400 p.p.m., and completely inhibited at 800 p.p.m.

4037. Thomson, R.
Control of lateral growth in flue-cured tobacco by chemicals.
N.Z. J. Sci. Tech., Sect. A, 1952, **33**: 6: 78-80, bibl. 7.

Of the treatments tested maleic hydrazide was the most effective, and with a 1% application growth of laterals was negligible. Mineral oil also gave good practical control of laterals. The butoxy ethanol ester of 2,4,5-T gave some measure of control but results were erratic. The methyl ester of naphthaleneacetic acid gave insufficient control to be of practical value. The last two substances caused distortion of the upper leaves.—D.S.I.R., Motueka.

Composition and metabolism.

(*See also* 4067d, e.)

4038. McClendon, J. H.
The intracellular localization of enzymes in tobacco leaves. I. Identification of components of the homogenate.
Amer. J. Bot., 1952, **39**: 275-82, bibl. 34, illus.

A method for the fractionation of leaf protoplasm into four arbitrary mixtures is outlined and studied from the point of view of determining the fate of the nuclei, chloroplasts and mitochondria when so treated. A method for the determination of pentose and desoxypentose nucleic acids (PNA and DNA) is applied to leaves for the first time. As the method determines phosphorus, pentose or desoxypentose, and purines and pyrimidines independently, internal comparisons were made, showing incomplete separation of PNA from DNA. The data were usable, however, from strained homogenate fractions. With whole leaf tissues, PNA and DNA could not be distinguished, due to interferences with the sugar tests. Using the DNA assays to test for nuclei, chlorophyll to test for chloroplasts, and comparing both with protein content, comparisons were made with microscopically observable structures. Although the nuclei were dispersed, the DNA sedimented at the same rate as the chloroplasts, presumably adsorbed thereon. Evidence for mitochondria lies in the presence of slowly sedimenting material low in both chlorophyll and DNA, as they could not be shown microscopically in homogenates. Limited comparisons were made with other data on nucleic acids in plants and animals. This study should enable future work on the intracellular localization of enzymes in leaves to be done more critically. [Author's summary.] —Hopkins Marine Station, Stanford Univ., Calif.

4039. Dawson, R. F.
Alkaloid biogenesis: nicotine demethylation in excised leaves of *Nicotiana glutinosa*.
Amer. J. Bot., 1952, **39**: 250-3, bibl. 10.

An earlier paper traced the origin of nornicotine in the genus *Nicotiana* to a demethylation of nicotine in the aerial shoot. In the present paper the demethylation of nicotine was studied in excised leaves of *Nicotiana glutinosa* that had been rendered initially alkaloid free and were fed with nicotine through the transpiration stream. Little or no demethylation occurred during the first 12-24 hr. of culture, although alkaloid uptake was then at a maximum. This time lag was found to be due to the fact that only intact green cells of leaf blade and petiole were able to conduct the transformation. The reaction was irreversible under the conditions of these experiments.—Columbia Univ., N.Y.

4040. Zbinovsky, V., and Burris, R. H.
Metabolism of infiltrated organic acids by tobacco leaves.
Plant Physiol., 1952, **27**: 240-50, bibl. 17.

Detached leaves of tobacco [Havana 38], were vacuum infiltrated with solutions of C^{14}-labeled formic, oxalic, glycolic, acetic, malic or citric acids adjusted to pH 5·5. After the leaves [had] metabolized in the light or dark, their organic acids were recovered and were analyzed for C^{14}. Formic acid apparently is a normal metabolite in tobacco leaves. It was converted rapidly to other organic acids and particularly high levels of C^{14} appeared in malic acid. Oxalic acid was rather inert in tobacco but [has been shown to be] more active in buckwheat leaves. When labeled glycolic acid was metabolized in the dark, the ratio of C^{14} in citric/malic acid was markedly higher than in the light. Both in light and dark much C^{14} from glycolic acid accumulated in oxalic acid. In the dark, acetic acid yielded citric acid of about twice the specific activity of malic acid. Acetic acid did not appear to be oxidized by way of glycolic acid. Malic acid was converted to citric acid by the darkened tobacco leaf. Citric acid was converted sluggishly to other organic acids. [Authors' summary.] —University of Wisconsin.

4041. Tombesi, L.
Ricerche di fisiologia e di biochimica su *Nicotiana tabacum* var. Virginia bright. Nota I.—Il metabolismo del Virginia bright in funzione delle disponibilità idriche del suolo. **(Physiological and bio-chemical research on Virginia bright. Note 1. Metabolism in relation to soil water supply.)**
Tabacco, 1951, **55**: 312-25, bibl. 7.
A study of the metabolism of Virginia bright in relation to soil water supply established the following points: (1) with reduction of water supply oxidase activity increases until almost doubled, while the content of reducing compounds becomes less; (2) when the soil water supply is suitably limited respiration intensity, carbonic anhydrase activity and amide N content increase; (3) peroxidases do not appear to be affected by the water factor. As previously noted yellowing during the curing of Virginia bright does not occur when oxidases are high and reducing compounds low.

Viruses.

(*See also* 3298.)

4042. Steere, R. L.
Virus increment curves obtained from counts of particles in clarified plant juice.
Amer. J. Bot., 1952, **39**: 211-20, bibl. 21, illus.
Curves showing the increment in number of virus particles following inoculation have been obtained for tobacco mosaic virus multiplying in plants of White Burley tobacco and for tomato bushy-stunt virus multiplying in plants of *Datura meteloides*. The normal particle increment curves for both viruses resemble standard sigmoid growth curves and curves of autocatalytic reactions. There is an initial unresolved phase followed by a logarithmic phase at 20-72 hr., during which period the virus concentration doubles every 4 hr. Then follows a maximum stationary phase with as much as 11·7 per cent., dry weight, of the leaf tissue present as virus particles. Experimentally altered curves were produced by placing infected plants in a chamber kept at 38° C. These curves show an immediate cessation of virus multiplication at this temperature, when the treatment is applied 54 hr. after inoculation, but a retarded cessation when treatment is applied at 24 hr. [From author's summary.] —Univ. Michigan.

4043. Koenig, H. J.
Kennzeichen (Symptome) der Viruskrankheiten an Tabakpflanzen. **(Characteristics (symptoms) of the virus diseases of tobacco plants.)**
Tabak-Forsch., 1951, No. 6, pp. 1-4, from abstr. in *Rev. appl. Mycol.*, 1952, **31**: 302.
On the basis of 46 contributions to the relevant literature the symptoms associated with the several tobacco viruses are described under four headings, viz., (1) foliar discolorations, (2) foliar malformations, (3) leaf, stem, and root necroses, and (4) symptoms on the flowers, capsules, and seeds.

4044. Commoner, B., Newmark, P., and Rodenberg, S. D.
An electrophoretic analysis of tobacco mosaic virus biosynthesis.
Arch. Biochem. Biophys., 1952, **37**: 15-36, bibl. 19, illus.
Frequent electrophoretic analyses of mosaic-infected tobacco leaf tissue were made both in the presence and absence of thiouracil. Calculations of the concentration of TMV made in this way gave comparable results to microanalysis. TMV appears at 72 hrs. after inoculation, increases in concentration up to 200 hrs. and thereafter remains constant. The studies provide what is believed to be the first direct evidence of the formation of a distinctive non-virus component, *B*, in virus-infected tissue; the properties of component *B* are consistent with those of a protein. Both infected and healthy leaf tissue contain a heterogeneous electrophoretic component, group *A*, which appears to be variable in composition; the concentration of group *A* is variable with time, indicating that the proteins, by contrast with TMV and component *B*, are readily metabolized. In infected leaf tissue TMV biosynthesis is associated with the development of a transitory excess in the concentration of group *A* as compared with healthy controls. In the presence of 0·0001 *M* thiouracil leaf tissue forms only 40% of the TMV concurrently present in untreated tissue and component *B* does not appear. With 0·001 *M* thiouracil no TMV is formed and the concentration of group *A* in healthy tissue is reduced. It is likely that the inhibitory effect of thiouracil on TMV biosynthesis is associated with its effect on the group *A* proteins. The possibility that component *B* represents a TMV precursor and that some part of the group *A* complex is involved in TMV biosynthesis is discussed.—Washington Univ., St. Louis, Missouri.

4045. Limasset, P.
Quelques remarques sur l'utilisation de la réaction de fixation du complément pour l'étude des maladies à virus des plantes. **(The use of the complement fixation reaction in studying virus diseases of plants.)**
Ann. Épiphyt., 1952, **3**: 83-101, bibl. 6.
The principles of the complement fixation reaction for studying plant viruses are stated and results obtained by the Kolmer technique are described and tabulated for the virus of tobacco mosaic and the viruses X and Y of potato.—Stat. centr. Path. veg., Versailles.

4046. Brock, R. D.
The use of trisodium phosphate as an inactivating agent for plant viruses.
J. Aust. Inst. agric. Sci., 1952, **18**: 41-3, bibl. 7.
With a view to finding a more effective and less objectionable substitute for formalin, experiments were carried out with several sterilizing agents. A 10% solution of trisodium phosphate was found to be a safe and effective sterilizing agent against tobacco mosaic virus and potato virus X for both instruments and hands.

4047. FORSTER, R.
Inativação do vírus do mosaico comun do fumo pelo filtrado de culturas de *Trichoderma* sp. **(Inactivation of the common mosaic virus of tobacco by a filtrate of cultures of *Trichoderma* sp.)** [English summary ½ p.]
Bragantia, 1950, **10**: 139-48, bibl. 9 [received 1952].

At the University of California it was found that the fungus *Trichoderma* sp., grown in liquid medium, produced a substance which caused up to 90% reduction in the infective capacity of the tobacco mosaic virus, measured by the number of local lesions on *Nicotiana glutinosa* half leaf inoculations. Inactivation occurred within 2 min. of adding the culture extract to the virus, and the degree of inactivation did not increase if the mixture were allowed to stand for a longer time. The filtrate showed inactivation power after only 2 days of culture. When cultures were grown in the light, the inactivation power decreased after the second day, possibly due to spore formation of the fungus, but when grown in the dark it increased for at least 22 days. It was not found possible completely to extract the inactivator by Weindling's method or by ultracentrifugation, but by using Takahashi's acetone method a whitish precipitate was obtained which showed inactivation of tobacco mosaic virus.

4048. VAN DER WANT, J. P. H.
Reaction of some *Nicotiana* species to tobacco rattle virus.
Reprinted from [*Proc.*] *World Tobacco Congr.* Amsterdam, 1951, as *Meded. Inst. PlZiekt. Onderz. Wageningen*, **38**, pp. 7, bibl. 5.

In inoculation tests the hybrids *Nicotiana tomentosa* × *N. tabacum* and *N. tomentosiformis* × *N. tabacum* proved to be as susceptible and sensitive to rattle infection as the tested *N. tabacum* varieties, which suggests that resistance to rattle disease in *N. tomentosa* and *N. tomentosiformis* is governed by one or more recessive characters.

4049. COSTA, A. S.
Beta patellaris, planta-teste para o vírus da necrose branca do fumo. **(*Beta patellaris*, a test plant for the Brazilian tobacco streak virus.)** [English summary 9 lines.]
Bragantia, 1950, **10**: 275-6, bibl. 3, illus. [received 1952].

A large number of plants from several families were studied in an attempt to find a suitable test plant for the Brazilian tobacco streak virus. Local lesions were not formed in the inoculated leaves of *Cyamopsis tetragonalobus*, which is used as a test plant for the American tobacco streak virus, and the lesions formed in *Nicotiana tabacum* and *N. rustica* were not considered satisfactory for counts. The most satisfactory results were obtained with *Beta patellaris*. The leaves of this plant developed local lesions 2 days after inoculation and the lesions could be counted after 4 days.

4050. JENKINS, W. A.
A lethal (virus) disease of fluecured tobacco, new to the old belt.
From abstr. in *Phytopathology*, 1952, **42**: 284.

In this disease immature infected leaves show definite but faint mosaic patterns unaccompanied by puckering of the tissues. Midveins and frequently other prominent veins are blackened, the necrosis generally continuing through the petiole into the cortex of the stem to cause sunken necrotic streaks throughout its length, and necroses develop in the pith and roots. Preliminary inoculations, using field material, indicate the presence of more than one virus, but their identity has not yet been determined.

Fungi and bacteria.

4051. KOCH, L. W.
Methyl bromide as a soil fumigant for disease, insect and weed control in tobacco and vegetable seed beds.
Down to Earth, 1951, **7**: 2: 1-2, illus., being *Contr. Div. Bot. Plant Path. Sci. Serv. Ottawa* **1112**.

In experiments with soil taken from tobacco farms and treated with Dowfume MC-2 (98% methyl bromide and 2% chloropicrin), control of damping-off disease organisms was excellent, weed control was good except for the seldom encountered round-leaved mallow (*Malva rotundifolia*) and clover, and a pronounced stimulation of seedling growth occurred in all fumigated soils when compared with growth in non-fumigated soils. These results were confirmed in greenhouse tests using greenhouse compost. In general it may be stated that the 2 lb. per 100 cu. ft. rate of methyl bromide application has proved to be sufficient to destroy all soil-borne diseases under Ontario conditions. The elimination of damping-off fungi and weeds was obtained at dosages as low as 2 ml. per cu. ft. (less than 1 lb. per 100 cu. ft.).

4052. MCGREW, J. R.
A preliminary screening of the genus *Nicotiana* for resistance to tobacco anthracnose.
From abstr. in *Phytopathology*, 1952, **42**: 343.

All commercial varieties of *Nicotiana* tested were found susceptible to tobacco anthracnose (*Colletotrichum* sp.). Seven species found to be highly resistant were *N. nudicaulis*, *N. longiflora*, *N. langsdorffii*, *N. alata*, *N. trigonophylla*, *N. debneyi* and *N. sylvestris*.

4053. VALLEAU, W. D.
Breeding tobacco for immunity to black shank.
From abstr. in *Phytopathology*, 1952, **42**: 288.

Resistance to black shank in varieties of *Nicotiana tabacum* is at present insufficient, and even the varieties considered resistant are satisfactory only in a rotation. *N. longiflora*, however, is immune. The immune factor is completely dominant in the $F_1 \times T$ and $T \times L$. The first back-cross with *N. tabacum* is sometimes completely immune. The second back-cross produces a few immune *tabacum*-like plants. Elimination of susceptible plants from a back-cross can be accomplished by inoculating seedlings a few days old or inoculating vigorous young transplants with swarm spores of the black shank fungus, *Phytophthora*

parasitica var. *nicotinae*; transplants developing leaf spots in about 48 hr. can be eliminated soon, and slow-growing susceptible plants can be eliminated in 48 to 72 hr. if a leaf of each is placed in distilled water containing swarm spores, susceptible leaves starting to decay in 40 to 60 hr. while immune leaves are unaffected.

4054. Lucas, G. B., and Moore, E. L.
Black shank control in tobacco plant beds.
From abstr. in *Phytopathology*, 1952, **42**: 285-6.

Black shank disease of tobacco, caused by *Phytophthora parasitica* var. *nicotianae*, has become prevalent in the field and in the tobacco plant beds in North Carolina. Seventeen different materials were tested at different rates for its control, and it was found that methyl bromide (15% by volume in xylene) and chloropicrin, applied as drenches at rates of 255 and 38 ml. per sq. yd. respectively, in 1 gal. of water, and methyl bromide gas at the rate of 1 lb. per 10 sq. yd. controlled the disease. Methyl bromide gas killed the fungus buried 6 in. deep in sandy loam soil.

4055. Nusbaum, C. J.
Host-parasite relations of *Phytophthora parasitica* var. *nicotianae* in roots of resistant and susceptible tobacco varieties.
From abstr. in *Phytopathology*, 1952, **42**: 286.

In cytological studies of black shank infections in inoculated roots of susceptible (402) and resistant (Dixie Bright 101 and 102) tobacco varieties, zoospore germination and direct penetration of the epidermis occurred within 3 hours. In young roots of the susceptible variety the mycelium rapidly invades cortical tissues and reaches the stele within 6 hours; in older lesions all tissues are invaded. In roots of resistant varieties epidermal penetration is similar; the infected and adjacent cells collapse; in most cases infection is limited to the cortex, but if infection reaches the stele, tissue invasion is similar to that in the xylem and pith of susceptible varieties.

4056. Prasad, N., and Patel, I. M.
Chitri disease of tobacco in Gujarat.
Curr. Sci., 1952, **21**: 18, bibl. 5.

From infection studies over 3 seasons it is concluded that chitri disease of tobacco is a complex of a root rot and wilt, for which 2 species of *Fusarium*, *F. oxysporum f. nicotianae* and *F. solani f. nicotianae*, are responsible.

4057. Steinberg, R. A.
Frenching symptoms produced in *Nicotiana tabacum* and *Nicotiana rustica* with optical isomers of isoleucine and leucine and with *Bacillus cereus* toxin.
Plant Physiol., 1952, **27**: 302-8, bibl. 7, illus.

It has been suggested by the writer that the stages leading to abnormal growth in frenching of field tobacco may be as follows: bacterial soil toxin→receptor→isoleucine→frenching. Rhizosphere studies, moreover, have shown that there may be a relationship between frenching and the presence of *Bacillus cereus* [see *H.A.*, 22: 1687]. In order to study further the frenching responses of tobacco to certain organic substances and to bacterial toxin from *B. cereus*, tests were made on seedlings of *Nicotiana tabacum* and *N. rustica* grown in aseptic culture. The results are summarized as follows: "Addition of either L-isoleucine or L-alloisoleucine produced symptoms of frenching in both species. L-Leucine was also effective with *N. rustica*. Relative effectiveness on tobacco was alloisoleucine> isoleucine; on *N. rustica*, alloisoleucine > leucine> isoleucine. L-Alloisoleucine was four times more effective (minimal range 2 to 8 p.p.m.) than L-isoleucine with tobacco. D-isoleucine, D-leucine, and D-alloisoleucine did not cause frenching symptoms. Neither did glycyl-L-leucine nor L-leucyl-glycine. A heat stable toxin from *Bacillus cereus* Fr. and Fr. also caused production of frenching symptoms in tobacco." —Bur. Plant Indust., Beltsville, Md.

Pests.

4058. Rosillo, M. A., and Rojo, N. A.
Un metodo de control de gusano minador del tabacco (*Faustinus cubae*) (Boh). (**A method of controlling *Faustinus cubae* on tobacco.**)
Idia, 1952, **5**: 49: 16-20, illus.

A short description of the bioecology of *Faustinus cubae* is given. Field control includes the burning of tobacco stalks after harvest, location of nurseries far from plantations and intensive destruction of host weeds. Experiments showed that the best nursery control is by treatment of the soil with insecticidal solutions. Insecticides tried were DDT, HCH, cryolite, CS_2, chlordane and dieldrin. The most satisfactory was 50% DDT at 2·5 ‰ at the rate of 1·5 l./sq. m. of bed applied first when the plants are 7-8 cm. tall, repeated after 4 and 8 days and then every 5 days up to transplanting.

4059. Tenhet, J. N., and Bare, C. O.
Lindane as an insecticide to control tobacco moth and cigarette beetle.
J. econ. Ent., 1952, **45**: 218-22.

Lindane in oil applied as space spray, thermal aerosol or fog gave satisfactory control of tobacco moth, *Ephestia elutella*, and cigarette beetle, *Lasioderma serricorne*, in a series of laboratory and warehouse trials, affecting the aroma and the smoking quality of the tobacco only very slightly or not at all.

4060. Boocock, D.
Use of pyrethrum with the Todd insecticidal fog applicator—Tifa.
Pyreth. Post, 1952, **2**: 4: 18-22, bibl. 7.

Fogging with 1% pyrethrum in white oil gave control of the tobacco beetle, *Lasioderma serricorne*, in South African bonded stores despite continual reinfestation by the arrival of fresh bales of tobacco. It proved a more effective method of application than spraying.

4061. Bertossi, F.
Effetti di preparati insetticidi a base di clordano (octaklor) sulle piante di tabacco. (**The effects of chlordane insecticides on tobacco plants.**)
Tabacco, 1952, **56**: 62-4, bibl. 10.

Experiments indicated that chlordane has a mild, temporarily toxic effect on young plants.

Curing.

4062. Tombesi, L., and Giovannozzi, M.
Ricerche di fisiologia e di biochimica su *Nicotiana tabacum* var. Virginia bright. Nota III. Parte prima. Sulle attività enzimatiche durante il processo di cura a fuoco indiretto. **(Physiological and biochemical research on *Nicotiana tabacum* var. Virginia bright. Note 3. First part. On enzyme activity during curing by indirect heat.)**
Tabacco, 1952, **56**: 53-61, bibl. 5.
Research was conducted on the activity of enzymes and certain catalysts in the leaf tissue during the Bright method of curing. It has previously been demonstrated that reduction of the water supply to the crop and increase in the NO_3 ions in the soil solution caused a considerable increase in oxidising activity and a reduction of ascorbic acid in the plants, especially in the leaves. Leaves of plants subjected to different water regimes and those which had been supplied only with nitrates were now cured by the Bright process. Results showed that: (1) leaf tissues tended to remain green; (2) to be sure of a good yellowing there should be a relatively high content of reducing compounds of the ascorbic acid type; and (3) all the environmental and varietal factors that determine an increase in the oxidizing enzymes and a decrease in ascorbic acid in the leaf tissues act negatively in the process of curing.

4063. Giovannozzi, M., and Verdura, R.
Ricerche di fisiologia e di biochimica su *Nicotiana tabacum* var. Virginia bright. Nota III. Parte seconda—Ricerche sulle trasformazioni chimiche durante il processo di cura a fuoco indiretto. **(Physiological and biochemical research on *Nicotiana tabacum*. Note 3. Second part. Research on chemical changes during the process of curing by indirect heating.)**
Tabacco, 1952, **56**: 67-85, bibl. 14.
Research on some of the chemical compounds in Virginia bright leaves obtained from plants raised under a normal (A) and a reduced (B) water regime showed: (1) greater loss in dry matter in B than in A; (2) diminution of protein by hydrolysis in both cases during the yellowing process, giving an increase in soluble N; (3) as a result, a higher content under B of total N, protein and nicotine, and a lower content of soluble N. The increased protein is associated with increased chlorophyll, to which is related the greater activity of oxidants and catalysts that causes low yellowing in Bright raised under B; (4) in both cases a considerable reduction in amide resulting in B in a considerable increase in sugars.

4064. Giovannozzi, M.
Studi sulla fermentazione dei tabacchi. Nota XIII. Sviluppo di microorganismi nel tabacco curato col metodo "Perique". **(Studies on the fermentation of tobacco. Note 13. Development of microorganisms in tobacco cured by the Perique method.)**
Tabacco, 1952, **56**: 50-2, bibl. 4, illus.
Tobacco cured under the Perique system in Louisiana, U.S.A., displays the same microbial development in the leaves as that cured by the methods in common use in Italy.

4065. Perucci, E.
Nuovo sistema italiano di fermentazione del tabacco. **(A new Italian method of tobacco fermentation.)**
Tabacco, 1951, **55**: 275-84, illus.
The new method is based on the Donadoni silo system but avoids the use of semi-cured material having a residual humidity of 30%. The preventive heating of completely cured and dried tobacco ensures a rapid fermentation process with a minimum humidity of 16-18%.

4066. De Bonis, E., and Verdura, R.
Ricerche sulla cura del "Beneventano". **(Research on the Beneventine method of curing.)**
Tabacco, 1951, **55**: 259-74, bibl. 4.
The Beneventine method is used for curing Brazilian Beneventine tobacco in the Benevento-Avilleno district of Campania. After partial drying the leaves are piled and allowed to ferment and are afterwards spread out to complete the drying process.

Noted.

4067.

a Corbett, G.
Burley tobacco.
Countryman, Nicosia, 1951, **5**: 3: 6-7.
For Cyprus.

b Corbett, G.
The care and management of tobacco seedbeds.
Countryman, Nicosia, 1951, **5**: 2: 14-15.
Including note on frost protection in Cyprus.

c Cova, P.
Note sull'impiego di mano d'opera nella coltivazione e lavorazione del tabacco. **(Note on the use of labour in the cultivation and processing of tobacco [in Italy].)**
Tabacco, 1952, **56**: 35-49.

d Parker, G.
A study of the breakdown of ribonucleic acid in tobacco-leaf extracts.
Biochem. J., 1952, **51**: 389-99, bibl. 32.

e Vickery, H. B., and Hargreaves, C. A. II.
The metabolism of the organic acids of tobacco leaves. IV. Effect of culture of excised leaves in solutions of citrate.
J. biol. Chem., 1952, **196**: 409-22, bibl. 13.

MISCELLANEOUS TEMPERATE AND TROPICAL CROPS.

Bamboos.

(*See also* 4527, 4531.)

4068. PRESTON, R. D., AND SINGH, K.
The fine structure of bamboo fibres. II. Refractive indices and wall density.
J. exp. Bot., 1952, **3**: 162-9, bibl. 8, illus.

In the fibres of *Dendrocalamus strictus* and *D. longispathus* it has been shown that the refractive indices of the outer wall lamella, parallel and perpendicular to cell length, are correlated not only with cell length but also with the density of the whole wall. The indications nevertheless are still that the variation in refractive indices with cell length are mainly due to changes in the orientation of the cellulose microfibrils. There is, however, a subsidiary effect of factors associated with density. These factors are briefly discussed. [Authors' summary.]—University of Leeds.

Culinary and spice plants.

(*See also* 4124j, p.)

4069. MINISTRY OF AGRICULTURE, LONDON.
Culinary and medicinal herbs.
Bull. Minist. Agric. Lond. **76**, revised 1951, pp. 46, bibl. 11, 1s. 9d.

This bulletin, first published in 1936 [see *H.A.*, 6: 238], was suspended during the war and its place was taken by 2 smaller ones, dealing separately with the cultivation of culinary herbs and medicinal plants. The original comprehensive bulletin has now been reissued and considerably revised. Although the former section on aromatic herbs used in perfumery and confectionary has been omitted, many of the plants mentioned in it, including lavender, are now dealt with in the section on medicinal herbs. The entertaining introduction to the original bulletin, on the historical development of herb growing, has been drastically cut. All the former line drawings have been omitted, but there are 3 excellent new drawings by Dr. Hutchinson. The photographs all illustrate aspects of horseradish production.

4070. NELSON, R.
Mint rust and its control.
Quart. Bull. Mich. agric. Exp. Stat. 1952, **34**: 436-55, bibl. 4, illus., being *Contr. Dep. Bot. Plant Path. Mich. St. Coll.* **52-7**.

The development of rust, *Puccinia menthae*, in commercial plantings of peppermint in Michigan in 1951 introduced a new and serious control problem for the mint industry. Breeding of resistant varieties, which appears to be somewhat easier in spearmint than in peppermint, offers the most satisfactory solution of the rust problem, and results obtained to date are encouraging. In control trials with fungicidal dusts applied by a land duster to mint grown in rows, fermate was found the most effective material, and tribasic copper sulphate also showed promise. For the control of rust in meadow plantings aeroplane applications are recommended.

4071. KHAN, A. R., AND GHAYUR, A.
Ginger (adrak) cultivation in the Punjab.
Punjab Fruit J., 1951/1952, **15**: 52: 6-8.

A brief account is given of soil requirements, planting, cultivation, preparation for market, varieties, uses and economic importance.

4072. PACINI, G.
Cultura da pimenta do reino (*Piper nigrum*). **(The cultivation of black pepper.)**
Rev. Ceres, 1951, **8**: 417-23, bibl. 4.

The cultivation of *Piper nigrum* in Brazil is described, with notes on its economic importance, origin, biology, soil, climate, propagation (by seeds and by cuttings), cultural treatment, harvesting and processing, pests and diseases.

Drug Plants

(*See also* 4124a, c, d, h, i.)

4073. RASTOGI, R. P., SHARMA, V. N., AND DHAR, M. L.
Chemical examination of *Ailanthus malabarica* DC.
J. sci. industr. Res., India, 1952, **11B**: 124-5, bibl. 3.

A note on the non-glucosidal bitter principle, malanthin, isolated from the bark of the drug plant *A. malabarica*.

4074. COLLETT, S.
Khellin and other drugs from *Ammi visnaga*.
Manuf. Chem., 1952, **23**: 235-8, bibl. 17.

The fruits of *Ammi visnaga*, an umbelliferous annual growing freely in the Nile Delta, have long been used for medicinal purposes in Egypt. Fresh interest in this plant has been aroused by the discovery that khellin, one of its active principles, is a useful drug in the treatment of asthma and whooping cough. This paper describes the preparation, properties, structure and pharmacology of khellin and deals also with khellinin and visnagin, two other drugs derived from the plant.

4075. GATTEFOSSÉ, J.
L'*Ammi visnaga* et la khelline. **(*Ammi visnaga* and khellin.)**
Rev. int. Bot. appl., 1952, **32**: 116-22, bibl. 56.

Ammi visnaga, an umbelliferous plant found frequently in certain parts of southern France, is of value in pharmacy as the source of the drug khellin. The botanical characters and distribution of the plant are outlined, and the literature on its properties and medicinal value is reviewed.

4076. YOUNGMAN, B. J.
Professor Naonori Hirota's work on camphor trees.
Kew Bull., 1952, No. 1, pp. 61-5.

An indication is given of the scope of Hirota's work on camphor trees in Formosa which is to be published in *Mem. Ehime Univ., Sect.* 2, 1951, 1, No. 2. He has suggested a new classification of *Cinnamomum camphora* with sub-species based on morphological characters and sub-varieties based on the constituents of the essential oils in the leaf.

4077. CLEMO, G. R., AND NATH, B.
The delphinine alkaloids. Part I.
J. chem. Soc., Lond., 1952, pp. 1750-3, bibl. 10.

A new crystalline base has been isolated from the seeds of *Delphinium staphisagria*, in addition to the known alkaloids delphinine and staphisine.—King's College, Newcastle-on-Tyne.

4078. Gupta, B., and Bal, S. N.
Pharmacognosy of Indian ephedras.
J. sci. industr. Res., India, 1952, **11B**: 253-5, illus.

Although some Indian species of *Ephedra* conform to the B.P. standard for ephedrine, adulteration and lack of standardization has made it impossible to establish an export market. Macroscopic and microscopic characters of 4 Indian species, *E. nebrodensis*, *E. gerardiana*, *E. intermedia* and *E. foliata*, are described and illustrated.

4079. Chevalier, A.
Travaux français sur le genre Eucalyptus. **(French work on the genus *Eucalyptus*.)**
Rev. int. Bot. appl., 1952, **32**: 105-12, bibl. 4.

The distribution of the *Eucalyptus* species is briefly outlined, and the author discusses the part played by French workers in the recognition and distribution of these plants under the headings: 1. the discovery of *Eucalyptus* spp.; 2. the first French work and the descriptions of *Eucalyptus* spp.; 3. their introduction into France and Algeria; 4. new forms of *Eucalyptus* which have appeared in North Africa; 5. species for tropical regions; 6. the future cultivation of *Eucalyptus*.

4080. Datta, A., and Datta, D.
Microscopical studies on the leaves of *Eucalyptus globulus* Labill. and three other species grown in India.
J. sci. industr. Res. India, 1952, **11B**: 181-5, bibl. 7, illus.

The dried leaves of *E. globulus* are the source of the crude drug eucalyptus. Three other species, *E. rostrata*, *E. viminalis* and *E. polyanthemos*, are commonly used as adulterants in India. As an aid to identification the morphological and histological characters of juvenile and mature leaves of the 4 species are described and illustrated in detail.

4081. Lang, A.
Untersuchungen über das Kältebedürfnis von zweijährigem *Hyoscyamus niger*. **(The chilling requirements of biennial *Hyoscyamus niger*.)**
Züchter, 1951, **21**: 241-3, bibl. 9.

Herbane plants were exposed to temperatures of +3°, 6°, 10°, 14° and 17° C. under short-day conditions for periods of 7 to 105 days. The time needed for the formation of flower primordia after transfer of the plants to long-day conditions at 23° C. was found to decrease with length of treatment. In short the greater the cold the quicker was the effect. The theoretical implications of this and other findings are discussed.—Inst. of Technology, Pasadena, Calif.

4082. Mendes, J. E. T.
Dimorfismo de ramos em *Hydnocarpus*. **(Dimorphism of the branches of *Hydnocarpus*.)** [English summary 5 lines.]
Bragantia, 1950, **10**: 177-8, bibl. 4, illus. [received 1952].

Seeds of the chaulmoogra tree (*Hydnocarpus* spp.), which grows wild in Burma and Indo-China, contain an oil used in the treatment of leprosy. The best oil is obtained from the species *H. laurifolia* and *H. kurzii*. These were introduced into the Campinas Institute of Agronomy with a view to establishing commercial plantations in Brazil. Experiments in propagation methods showed that the trees had 2 forms of branch. Vegetative propagation of an upright-growing (orthotropic) branch gave rise to a normal plant, whereas vegetative propagation of a lateral (plagiotropic) branch gave rise to a plant which produced only lateral branches and was therefore of no commercial value.

4083. Zambettakis, C.
Recherches sur l'helminthosporiose de l'oeillette et son traitement. **(Research on the helminthosporosis of the opium poppy and its control.)**
Ann. Épiphyt., 1952, **3**: 11-59, bibl. 75, illus.

Helminthosporiose is a very serious disease of the opium poppy. It often destroys whole plantations in Europe and Asia. A biological study of the causal organism, *Helminthosporium papaveri*, has been made to determine its mode of infection, its dissemination and persistence from year to year, and a method of seed treatment. Copper ortho-oxyquinolinate as a powder used at the rate of 600 g. per hectolitre of seed has been found to be the best seed disinfectant.

4084. Schrödter, H., and Nolte, H. W.
Freilanduntersuchungen über den Einfluss der Temperatur auf Eiablage und Larvenentwicklung des Mohnkapselrüsslers *Ceuthorrhynchus macula-alba*. **(Field observations on the effect of temperature on the egg laying and larval development of the opium poppy capsule weevil.)**
Nachr. dtsch. PflSchDienst, Berlin, 1952, **6**: 67-72, bibl. 11.

Correlation analyses show that for the opium poppy capsule weevil the temperatures most favourable for oviposition are 20-25° C. The development of the larvae from the time of hatching until they leave the capsules depends upon a temperature summation of 98 degrees over a thermal development zero of 13° C. The observations recorded indicate that the climate of middle Europe is very favourable for outbreaks of weevils and precautionary measures are necessary.—Biologische Zentralanstalt, Aschersleben.

4085. Gupta, B., and Bal, S. N.
The senegas of Indian market.
J. sci. industr. Res., India, 1952, **11B**: 116-21, bibl. 15, illus.

To facilitate the elimination of adulterants commonly mixed with senegas in Indian markets descriptions are given of the macroscopic and microscopic characters of the roots of *Polygala chinensis*, *P. senega* and 4 spurious senegas.

4086. de Visser Smits, D.
***Strophantus gratus* (Wall. and Hook.) Franch.** [English abstract 9 lines.]
Indones. J. nat. Sci., 1951, **107**: 140-61, bibl. 309.

Botanical, chemical and pharmacological data are given on *Strophanthus gratus*, a native of W. Africa which is grown as an ornamental in Indonesia. It is the

only source of the drug g-strophantine. It is proposed that the plant should be cultivated in Indonesia for the production of biological therapeutants.

4087. REINACH, O.
Sur la culture des *Strophanthus* en Afrique. I. Réflexions générales. **(The culture of *Strophanthus* spp. in Africa. I. General considerations.)**
Rev. int. Bot. appl., 1952, **32**: 163-8.
A substance, sarmentocymarine, extracted from the seeds of some species of strophanthus shows close similarity in molecular constitution to the drug cortisone. It is concluded that discrepancies in earlier results were due to analyses that were made on preparations consisting of mixtures from the seeds of a number of *Strophanthus* species. To obtain a plant product as a basis for the preparation of cortisone it is necessary to examine the seeds of a large number of species of *Strophanthus* and of their hybrids. This work has been started and seventeen species are already being grown in a nursery collection.

4088. MONACHINO, J.
Strophanthus, sarmentogenin and cortisone.
J. N.Y. bot. Gdn, 1950, **51**: 25-39, bibl. 22, illus. [received 1952].
Botanical aspects of the story of strophanthus, the source of sarmentogenin and cortisone, are here reviewed. There is still considerable doubt whether the original seeds found to yield sarmentogenin were of the species *S. sarmentosus*, and various other species that have been examined or await investigation are mentioned. [See also *H.A.*, 21: 2797.]

4089. VIENNOT-BOURGIN, G.
Les rouilles du *Strophanthus sarmentosus* en Afrique occidentale et equatoriale française. **(The rusts of *Strophanthus sarmentosus* in west and equatorial French Africa.)**
Rev. int. Bot. appl., 1952, **32**: 2-14, illus.
The morphology and distribution of two rust fungi found in tropical Africa on *Strophanthus sarmentosus* are described, viz. *Hemileia strophanthi*, and *H. smallii*.

4090. JOSHI, C. G., AND MAGAR, N. G.
Antibiotic activity of some Indian medicinal plants.
J. sci. industr. Res., India, 1952, **11B**: 261-3, bibl. 9.
The antibiotic activities against 2 bacteria of extracts of various tissues of a large number of Indian medicinal plants are tabulated.

4091. ZIARKIEWICZ, T.
Z badań nad biologia owadów występujących na niektórych roślinach leczniczych. **(Studies on the biology of insects infesting medicinal plants.)** [English summary ½ p.]
Ann. Univ. Mariae Curie-Skłodowska, Sect. E, 1951, **6**: 201-29, bibl. 27.
A description is given of 31 insect species, 16 of which are noted for the first time on medicinal plants in Poland, attacking *Angelica archangelica*, *Inula helenium*, *Melissa officinalis*, *Salvia officinalis*, *Mentha crispa* and *Valeriana officinalis*. The highest number of species observed was in July and August and of all the plants *Melissa officinalis* was the most badly infested.

Essential oils.

(*See also* 4124b, e, g, n.)

4092. NAVES, Y.-R.
Production of essential oils by distillation.
Manuf. Chem., 1951, **22**: 219-21.
The isolation of essential oils from vegetable materials will not be established on a truly scientific basis until we know the exact location in the plants of the constituents and the changes to which they are susceptible after contact with boiling water. [From author's conclusions.]

4093. JANSON, B. F.
Fusarium root rot and wilt of dill.
Phytopathology, 1952, **42**: 152-5, bibl. 7, illus.
Dill (*Anethum graveolens*) is now cultivated as a commercial crop in the United States for its essential oils which are used as perfumes. A destructive root rot and wilt of dill, discovered in Ohio in 1949, has been found to be caused by a new *Fusarium* sp. Six preparations tried as seed treatments failed to give satisfactory control.—Ohio State Univ.

4094. WILBAUX, R., AND NEYBERGH, A.
Essais de distillation et données analytiques sur l'essence de vétiver au Kivu. **(The experimental distillation of vetiver oil at Kivu and its analytical results.)**
Bull. agric. Congo belge, 1951, **42**: 901-32, bibl. 7, illus.
After a review of present knowledge of the composition of vetiver oil, analytical results are given of experimental, semi-industrial distillation at the OPAC laboratories, Kivu, Belgian Congo.

4095. COSTA, A. S., LIMA, A. R., AND JACOB, A.
Mosaico da citronela. **(Citronella mosaic.)** [English summary 7 lines.]
Bragantia, 1950, **10**: 301-4, bibl. 3, illus. [received 1952].
Inoculation tests carried out with a virus of citronella (*Cymbopogon winterianus*), commonly found in experimental plantings in São Paulo, Brazil, and sugar cane mosaic showed that the symptoms induced by both these viruses on a number of host plants were alike. The properties of the 2 viruses were also similar. It is concluded that the citronella mosaic virus belongs to the sugar cane mosaic virus complex.

4096. BROWN, E., AND MATTHEWS, W. S. A.
Notes on the aromatic grasses of commercial importance.
Colon. Plant. Anim. Prod., 1951, **2**: 174-87.
Information is given on habitats, climatic and soil requirements, propagation and cultivation, harvesting, distillation, yields and uses of the oils of the following grasses: Lemon grass (*Cymbopogon flexuosus* and *C. citratus*), citronella (*Cymbopogon nardus* and *C. winterianus*), palmarosa and ginger grass (*Cymbopogon martini* var. *motia* and var. *sofia*), and vetiver (*Vetiveria zizanioides*).

Fibres.

(*See also* 3477n, 4124.)

4097. Spoon, W.
Het drijfvermogen van kapok als maatstaf voor de beoordeling. **(The buoyancy of kapok as a measure of quality.)** [English summary ¼ p.]
Reprinted from *Chem. Weekbl.*, 1951, **47**: 1030, bibl. 6, illus., being *Ber. Afd. trop. Prod. kon. Inst. Tropen Amsterdam* **235**, pp. 9.

A method for the determination of the buoyancy of kapok, that can be used as a measure of quality, is described and illustrated. The results obtained with samples of kapok from Java and from Africa are tabulated. It is shown that for kapok of good quality an initial buoyancy of 27 g. per g. kapok, with a decrease of 0·5–1·0 g. after 24 hr. submersion, is required.

4098. Feuell, A. J., and Jarman, C. G.
Manila hemp from Malaya.
Colon. Plant Anim. Prod., 1951, **2**: 201-3.

Four samples of Manila hemp from Malaya are described and evaluated. They represent a considerable improvement on earlier samples, and commercial prospects would appear to be good, although fibre strength was not so good as it should be. A commercial sample should now be submitted.

4099. Lefort, M.
La ramie, une fibre d'avenir pour l'industrie du caoutchouc. **(Ramie, a fibre of potential value to the rubber industry.)**
Rev. gén. Caoutch., 1952, **29**: 390-6, bibl. 25, illus.

This review includes brief accounts of the distribution, cultivation, and world production of ramie, the methods of extracting its fibre, and the characteristics and uses of the fibre.

4100. Daza, D. M.
Fertilization of ramie with ammonium sulfate.
Philipp. Agric., 1951, **35**: 1-9.

In a replicated experiment at the University College of Agriculture, Los Banos, using one-year-old crops of 4 commercial varieties of ramie, ammonium sulphate (20% N) was applied at 300, 400 and 500 kg. per ha. in combination with tops and pulp after the harvests of September 1948, December 1948 and March 1949. Results were: (1) an increased number of stalks per plant was produced by all varieties in all harvests whenever there was adequate moisture; (2) mean height was significantly greater than in the controls in all harvests; (3) treatment did not increase branching; (4) the maturation period was significantly greater. All results are given in detail.

4101. Gangstad, E. O., Joyner, J. F., and Seale, C. C.
Agronomic characteristics of sansevieria species.
Trop. Agriculture, Trin., 1951 (issued 1952), **28**: 204-14, bibl. 15, illus.

As a result of studies in South Florida by the U.S. Bureau of Plant Industry and the Everglades Experiment Station the species of *Sansevieria* have been classified into 3 large inter-grading groups based on the botanical characteristics of the leaf, rhizome and fibrous root system. Group I includes the cylindrical leaf species *S. ehrenbergii* and *S. cylindrica*, which have been found unsatisfactory for commercial production because of their difficulty of propagation, slow growth rate and low acre yield of fibre. Group II contains the coriaceous leaf species *S. liberica* and *S. longiflora*, which have shown some promise for annual harvesting because of their ability to produce rapid leaf growth when planted from rhizomes; they contain the highest percentage of fibre, but have comparatively short leaves and are readily damaged by low temperatures. Group III consists of the narrow or petiolar leaf species, which, by reason of their ability to grow quickly from leaf cuttings and to give a high yield of fibre per acre, offer the best possibilities for commercial production. Of the three species examined *S. trifasciata* with satisfactory tolerance to cold and good fibre content and length of leaf would appear to be the most promising for South Florida. *S. trifasciata* var. *laurentii* is more tolerant to cold but has a lower fibre content, while *S. thyrsiflora* has a higher fibre content but is more susceptible to cold.

4102. Lock, G. W., and Johnson, P.
Sisal cultivation in Tanganyika Territory. The problem of mechanization.
Roadless News, 1950, **15**: 33-5, 41-4; 1951, **15**: 49-53, 57-60, 65-71, all illus.

The first of this series of articles reviews the problem of mechanized sisal growing and describes methods of planting, and in particular the double row system. The second describes the operations involved in the clearing of virgin land. The third describes the raising of plants in nurseries and discusses the possibilities of mechanized planting of bulbils, weeding and lifting the plants preparatory to transfer to the field. The fourth deals with the cultivation of young sisal, the maintenance of a vegetal strip between the double rows of sisal, and harvesting and trimming the leaves. The final article discusses transport of the leaves and touches on special conditions, such as steep hillsides, that are sometimes found on sisal plantations. It is hoped that the suggestions made will encourage British manufacturers to evolve machinery specially adapted to the needs of the crop.

4103. Alvim, P. de T.
Sintomas de deficiência mineral em *Agave sisalana*. **(Symptoms of mineral deficiency in *Agave sisalana*.)**
Rodriguesia, 1950, **13**: 25: 247.

Agave sisalana was grown in pots under conditions of K, N, Ca, Mg, Fe, and B deficiency respectively. Mg and not K deficiency appears to be the cause of necrosis of the leaf base, a disease common in Brazil. Control effected by the application of K is possibly due to (a) the presence of Mg as an adulterant in the fertilizer, or (b) base exchange promoting the availability of Mg. Field experiments on control by means of applications of Mg have been initiated. [See also *H.A.*, 21: 3024, *where please read twice* magnesium *for* manganese.] G.M.R.

4104. Thieme, J. G.
Fibre yield and leaf length of *Agave sisalana*.
E. Afr. agric. J., 1952, **17**: 111-15.

Studies in Sumatra showed that the use of weight of sisal leaves as a guide to the yield of fibre was apt to be unreliable. A relationship was found to exist, however, between weight of fibre and length of leaf, and formulae are described which express this relationship. These have since been confirmed in Kenya. To facilitate calculations a table is given showing lengths of leaf in 2 in. intervals from 1 to 6 ft., grams fibre per leaf, weight of leaf and percentage output of fibre, and the same information is also expressed graphically. The length formula was also found to be of value in Sumatra in controlling decorticator losses.

4105. DUBOIS, L.
Note sur les principales plantes à fibres indigènes utilisées au Congo belge et au Ruanda-Urundi. (Note on the principal indigenous fibre plants used in the Belgian Congo and Ruanda-Urundi.)
Bull. agric. Congo belge, 1951, **42**: 870-90, bibl. 15, illus.

The most important export fibre is that of *Urena lobata*, of which 7,500 tons valued at 111 million francs were exported in 1950. Other fibre crops grown are briefly described.

Hops.

(*See also* 4124k, 4200m.)

4106. EDWARDSON, J. R.
Hops—their botany, history, production and utilization.
Econ. Bot., 1952, **6**: 160-75, bibl. 18.

Early Cluster, Late Cluster and Fuggles are the principal hop varieties grown in the United States. The 1949 crop in the main producing states, Washington, Oregon and California, totalled 49,340,000 lb.

4107. KELLER, K. R., AND MAGEE, R. A.
The relationship of the total soft resin, alpha acid, and beta fraction percentages with yield of strobiles in hops.
Agron. J., 1952, **44**: 93-6, bibl. 9.

Experiments at the Oregon Agricultural Experiment Station, Corvallis, suggest that significantly different yield levels of strobiles within the variety Fuggles do not affect the percentage of alpha acid or the ratio of alpha acid to total soft resin content.

4108. KEYWORTH, W. G.
Hop propagation in Great Britain. [French and Spanish summaries ¾ p. each.]
Wallerstein Lab. Commun., 1950, **13**: 253-66, bibl. 10, illus.

Recent research has shown that old established methods of propagation and distribution are not compatible with efficient control of stock-transmitted disease. Though of great value, Governmental certification and other measures do not achieve complete disease control, and it is certain that the virus disease nettlehead, which affects all varieties and occurs in all areas, and mosaic disease, which attacks the high quality Golding hops, are often distributed in infected planting material. *Verticillium* wilt is even more important in the south-eastern hop areas. Control of both types of disease demands rapid production of stock and the commercial method of propagation (briefly described) is entirely inadequate. For some years research has been conducted into propagation by softwood cuttings and by layering. The former method (briefly described), chiefly uses cuttings from young main shoots and young side branches. It demands skilful nursery technique but can provide a large number of plantable sets in one year (instead of 2 per plant by other methods) and little space is required for propagation. Three layering techniques are described in some detail. The first is only applicable in established hopyards; the second is very suitable for use in special layer nurseries; and the third enables a very rapid build-up of stock to be made, as it permits immediate re-propagation from any cuttings produced. All methods of rapid propagation possess the paramount danger, however, that a single diseased parent can give rise to many more infected plants than hitherto. Hop propagation is, therefore, best carried out in special nurseries planted with carefully selected stock and preferably located in non-hop-growing districts.

4109. GIBB, J. A. C., AND CHATER, G. P.
The mechanization of hop picking.
Agriculture, Lond., 1952, **59**: 25-9, bibl. 2, illus.

Stationary hop picking machines have been in use since 1934 in England, mainly in the West Midlands. A prototype mobile machine is under trial which differs from American models in not severing the bines from their rootstocks, a procedure which may reduce subsequent yields. Types of picking machine and their sequence of operations and rates of working are described, and future possibilities discussed. [See also *H.A.*, 21: 3788.]

4110. BURGESS, A. H.
Notes on the physics of hop drying. [French and Spanish summaries ½ p. each.]
Wallerstein Lab. Commun., 1951, **14**: 111-17, bibl. 16.

Experiments under the Institute of Brewing, London, England, to study the factors involved in hop drying were conducted over a number of years in specially designed small kilns. *Effect of air temperature.* The rate of drying is proportional to the difference between the saturated vapour pressure of water at the temperature of the drying air and the vapour pressure due to the moisture originally present in the atmosphere. *Effect of depth of loading.* For any given conditions of air temperature and speed it is not possible to reduce drying time below a certain " minimum time ", and the " extra time " required is directly proportional to the depth of loading. *Effect of air speed.* The " minimum time " is only slightly affected, being proportional to $1/a^{0.39}$, and the " extra time " is more dependent on the air speed, being proportional to $1/a^{1.047}$, when a is the velocity of the emergent air. *Effect of gradually raised temperature.* The " extra time " is not influenced by the gradual rise in temperature necessary for the production of hops of the highest market quality. The " minimum time " can be determined graphically. The method is described.

4111. JONES, W.
Infection of basal shoots of hop plants by *Rhizoctonia solani*.
Sci. Agric., 1952, **32**: 114-15, illus., being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric. Ottawa* **1130**.

In May 1950 young basal shoots of hops were attacked by *Rhizoctonia solani* in a hop garden in British Columbia. The infection was confined to chlorotic shoots which were covered with soil after the cutting operations. The infection symptoms were reproduced in greenhouse trials on covered chlorotic shoots, but when the shoots were exposed to light and turned green no infection occurred. In 1951 the grower did not cover the crowns with soil after cutting and there was no evidence of field infection.

4112. CHOLLET, C. C., AND BREAKEY, E. P.
Control of aphids and mites on hops by organic phosphate insecticides.
J. econ. Bot., 1952, **45**: 349, being *Sci. Pap. Wash. St. agric. Exp. Stats* **1103**.

The insecticides CR-479 (Pestox) and E-838, applied for the control of the aphid, *Phorodon humuli*, and the spider mite, *Septanychus* n. sp., attacking hops in Washington, seemed to be somewhat better than E-1059, parathion and malathon, so far as residual action is concerned, though the differences may not be significant.

Rubbers.

4113. OZEROV, G. V.
Cold resistance of guayule. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1951, **80**: 265-7, bibl. 4, illus.

Experiments have shown that young guayule seedlings transplanted for the winter into a soil containing 30% field capacity moisture were considerably more cold resistant when submitted to artificial freezing (−13·2° C.), than seedlings transplanted into soils of 50% and 70% field capacity. In further trials the influence of the length of growing period on the hardiness of plants was studied. Seedlings transplanted on August 1 into soil of 70% moisture and growing actively till October 22 were subject to a high percentage of winter kill, while plants grown from August 1 at 30% moisture had their growth arrested on about August 15 and showed no visible signs of cold injury when growth was resumed later.

Seed oils.

(*See also* 4124f.)

4114. NADKARNI, G. B., AND PATWARDHAN, V. A.
Fatty oil from the seeds of *Ocimum sanctum* Linn. (Tulsi).
Curr. Sci., 1952, **21**: 68-9.

The seed yielded 17·82% of an oil with good drying properties. Details summarized here are to be published in full elsewhere.

4115. MOLNÁR, I.
A mákfajták B_1 vitamin és zsírtartalma.
(Vitamin B_1 and fat contents of poppy varieties.) [Russian and English summaries 2½ lines each.]
Agrártud. egy.,* 1950, **1**: 18-20, bibl. 5 [received 1952].

Analyses have shown the vitamin B_1 contents of the seeds of 3 poppy varieties to vary between 197 and 286γ %. The fat content of all seeds was found to be almost 50%, hence their nutritional importance in Hungary.

4116. MCGREGOR, W. G., AND HAY, W. D.
Safflower—Canadian experiments.
Sci. Agric., 1952, **32**: 204-13, bibl. 12, illus., being *Contr. Cereal Div., exp. Fms Serv., Ottawa* **163**.

Twenty-six lines of safflower of different origin have been tested since 1936. Trials in 6 provinces have shown the crop to produce its highest yields in southern Alberta, where it also appeared to compete successfully with weeds. At the Dominion Experimental Station, Lethbridge, much greater yields were obtained on irrigated than on dry land, although irrigation retarded maturity by a week or so and tended to increase disease incidence. Early sowing was generally beneficial.

4117. JANNONE, G.
Studi e ricerche di entomologia agraria in Eritrea e in Etiopia. VIII. Stato fitopatologico delle colture in un'azienda agraria del territorio di Fadis (Harar, Etiopia) con particolare riguardo a un'infestazione afidica del "Suff" (*Carthamus tinctorius*). **(Studies in agricultural entomology in Eritrea and Ethiopia. VIII. Phytopathological condition of the crops on an estate at Harar, Ethiopia, with special reference to an aphid infestation of safflower.)** [English summary ¼ p.]
Riv. Agric. subtrop., 1952, **46**: 132-7.

Entomological studies were made at Harar, Abyssinia, in 1940 on safflower (*Carthamus tinctorius*), castor bean (*Ricinus communis*) and *Phaseolus vulgaris*. In a mixed crop of safflower and castor bean the former was suffering severely from the attacks of an aphid (*Macrosiphum solidaginis* or sp. aff.). Owing to its proximity some of the aphids had attacked the castor bean, which is not one of their normal hosts, and as a result many of the insects had died.

4118. SCHUSTER, M. L., AND CHRISTIANSEN, D. W.
A foot and root disease of safflower caused by *Puccinia carthami* Cda.
Phytopathology, 1952, **42**: 211-12, bibl. 3, illus.

A foot and root disease of safflower (*Carthamus tinctorius*) caused by *Puccinia carthami* may seriously limit crop production. In one nursery in western Nebraska in 1950 it resulted in almost total loss due to infection of the underground parts. The disease damages seedlings as well as older plants, the earliest symptoms being noted when the seedlings are in the 6- to 8-leaf stage as a slight yellowing of the leaves with drooping or wilting. Seedlings often die suddenly without showing above ground symptoms. Seed treatment is ineffective since infection comes from contaminated soil, where the rust overwinters.—Neb. agric. Exp. Stat.

4119. THOMAS, C. A.
A greenhouse method of evaluating resistance in safflower to phytophthora root rot.
Phytopathology, 1952, **42**: 219-21, bibl. 3.

* Formerly *Bull. Fac. Hort. Buda*

The experiment recorded showed that resistance in safflower (*Carthamus tinctorius*) to root rot caused by *Phytophthora drechsleri* may be determined in the greenhouse, with plants grown in steamed soil in pots, inoculated with a mycelial suspension.—Plant Industry Station, Beltsville, Maryland.

4120. ARENS, K.
Estudo anatómico da semente de Ucuúba (*Virola surinamensis* Warb.). **(Anatomical study of the seed of *Virola surinamensis*.)**
Rodriguesia 1950, **13**: 25: 251-5, bibl. 3, illus.
A botanical study of the testa and kernel of *Virola surinamensis* seed (family Myristicaceae) is presented. The endosperm is distinguished by the presence of protein crystals of unusually large size. The seeds of this tree, which grows in periodically flooded lands of the Amazon region, have an oil content of over 60%. The expressed oil is of economic importance (approximately 1,000 tons were exported to North America in 1941), but because of the resin content of the perisperm the cake or meal composed of the residue is useless as fodder and of little use as fertilizer.
G.M.R.

Sundry plants.

(*See also* 41241, m, o, 4520.)

4121. GRIFFITHS, C.
Locust kernel gum.
Food, 1952, **21**: 58-9, illus.
Locust kernel gum or carob gum is the ground endosperm of the seeds of the locust tree, *Ceratonia siliqua*, a native of the Mediterranean. It is a carbohydrate, not a gum, and is used as a thickening agent. Its uses in the food industry are mentioned. The pods of the fruit are used as cattle fodder and as a source of carob syrup, and the embryo of the seed yields a valuable yellow meal.

4122. DEWAR, E. T.
Chemicals from the brown seaweeds.
Manuf. Chem., 1951, **22**: 179-81, bibl. 38.
Alginic acid, mannitol, laminarin, fucoidin and other constituents as well as their sources are discussed and a brief account is given of the Scottish seaweed industry.

4123. SHAW, H.
The wattle industry in South Africa.
Fmg S. Afr., 1952, **27**: 196-8, 213.
The history of the South African wattle industry, since seed of the black wattle, *Acacia mollissima*, was first introduced in 1864, is reviewed, and an outline given of research into the crop and its problems, culminating in the establishment of the Wattle Research Institute at Pietermaritzburg in 1947.

Noted.

4124.

a ANON.
A new source of cortisone.
Manuf. Chem., 1951, **22**: 360-1.
From the Mexican yam (*Dioscorea* sp.).

b BRIASCO, J. D., AND MURRAY, J.
Essential oils of New Zealand Podocarpaceae. I. *Dacrydium colensoi*.
J. appl. Chem., 1952, **2**: 187-92, bibl. 27.

c BULLOCK, A. A.
South African poisonous plants.
Kew Bull., 1952, No. 1, pp. 117-29.
An extensive list.

d CHATTERJEE, A., AND MAJUMDAR, S. G.
Alkaloids from *Glycosmis pentaphylla*, Correa.
Sci. and Cult., 1952, **17**: 306-7, bibl. 10.
G. pentaphylla is a medicinal plant.

e COLLETT, S.
Essential oil analysis with the salicylaldehyde reaction.
Manuf. Chem., 1952, **23**: 96-8, bibl. 2.

f DUFRESSE, M., AND BRYSSINE, P.
Le carthame. **(Safflower.)**
Terre maroc., 1952, **26**: 87-8.
Corrections to tables, etc., in earlier article [see *H.A.*, 22: 1718].

g GOONEWARDENE, E. T.
Citronella [*Cymbopogon nardus*] in Ceylon.
Foreign Agric., 1952, **16**: 114.

h GOPALACHARI, R., AND DHAR, M. L.
Chemical examination of the seeds of *Achyranthes aspera* Linn.
J. sci. industr. Res. India, 1952, **11B**: 209, bibl. 2.
Seeds, leaves and twigs are used in native Indian medicine.

i HATTORI, S., AND MATSUDA, H.
Rhoifolin, a new flavone glycoside, isolated from the leaves of *Rhus succedanea*.
Arch. Biochem. Biophys., 1952, **37**: 85-9, bibl. 7.

j HOLTTUM, R. E.
A new Malayan vanilla.
Gdns' Bull., Singapore, 1951, **13**: 251-3, illus.
A description of *Vanilla pilifera* Holtt. sp. nov.

k HOWARD, G. A., POLLOCK, J. R. A., AND HARRIS, J.
The chemistry of hop constituents. Part II. Oxidation products of lupulone. Part III. The structures of humulinic and *iso* humulinic acids.
J. chem. Soc., Lond., 1952, pp. 1902-6, 1906-14, bibl. numerous.
For part I *see ibid.*, 1950, p. 1873.

l MCILROY, R. J.
West African plant gums. Part I. *Khaya grandifoliola* and *Anogeissus schimperi*.
J. chem. Soc., Lond., 1952, pp. 1918-19, bibl. 6.

m NARASIMHA RAO, P. L., AND VERMA, S. C. L.
Antibiotic principles of *Garcinia morella*: Part II—Chemistry of morellin.
J. sci. industr. Res., India, 1952, **11B**: 206-9, bibl. 6.
Part I noted in *H.A.*, 22: 770m.

n RAZDAN, R. K., AND BHATTACHARYYA, S. C.
Sesquiterpenes from *Piper cubeba*, Linn.
Curr. Sci., 1952, **21**: 68, bibl. 12.
From the essential oil.

o ROGERS, E. F., SNYDER, H. R., AND FISCHER, R. F.
Plant insecticides. II. The alkaloids of *Haplophyton cimicidum*.
J. Amer. chem. Soc., 1952, **74**: 1987-9, bibl. 8.
For part I, see *ibid.*, 1948, 70: 3085.

p SHARP, L. K.
The assay of vanillin.
Analyst, 1951, **76**: 215-19, bibl. 8.

FLORICULTURE.

General.

(*See also* 3260, 3281, 3282, 3328, 3329, 3340, 3341, 3342, 3343, 3346, 3539, 4200n, 4505, 4508, 4511, 4514, 4519, 4523, 4537, 4561, 4564a.)

4125. DAVIS, M. R.
Prolonging the life of cut flowers.
Green Thumb, July 1949, reprinted in *Minn. Hort.*, 1950, **78**: 86-7.
WIDMER, R. E.
Prolonging the keeping qualities of cut flowers and greens.
Minn. Hort., 1951, **79**: 100.
Apart from the well known aspects of correct stage and time of picking, frequent change of water, use of clean containers, etc., the following admixtures to the water in which the flowers stand are stated to prolong the life of cut flowers: The commercial preparations " Bloomlife " and " Floralife " for all flowers; a solution containing hydrazine sulphate and sugar mainly for roses, carnations, and sweet peas; calcium nitrate for bulb cut flowers; alcohol for delphiniums, gladioli, sweet peas and zinnias. Other suggestions include singeing the ends of poppy stems, dipping rose stems in boiling water for 1 min., dipping the stems of hollyhocks in nitric acid and the use of plastic wax dips or sprays to prevent evaporation.

4126. ROISTACHER, C. N.
Phytotoxicity of formaldehyde residue on flats.
Phytopathology, 1952, **42**: 171-2, bibl. 1, illus.
When a 5% formalin solution was applied as a disinfectant to greenhouse seed boxes, injury resulted to several kinds of seedlings grown in them, including petunias and tomatoes. In tests described, boxes were sprayed with formaldehyde, some being kept dry and others wet, and were tested at daily intervals for the degree of seedling injury. Petunia seedlings were used as indicator plants because of their extreme sensitivity. The results show that 4-5 days of watering were necessary before the boxes could be safely used. Under normal greenhouse conditions 2 to 3 days of watering should suffice, depending upon other factors such as the concentration of the formaldehyde, the kind of plants grown and the humidity and temperature between treating and planting. If the seed boxes are kept dry, 10 days or more should elapse before use.—University of California.

4127. MOORE, F. J.
Some powdery mildews on ornamental plants.
Plant Path., 1952, **1**: 53-5, bibl. 9.
Notes are given about *Sphaerotheca fuliginea* on marigold, *Erysiphe polygoni* on statice, *Podosphaera oxyacanthae* var. *tridactyla* on cherry laurel, *E. polyphaga* on kalanchoë and *Oidium* sp. on lilac.

4128. CORKINS, J. P., AND METCALF, H. N.
Greenhouse tests of a trialkyl thiophosphate insecticide.
J. econ. Ent., 1952, **45**: 326-9, bibl. 2, being *Pap. J. Ser. Mont. agric. Exp. Stat.* **260**.
The systemic insecticide trialkyl thiophosphate showed promise as a greenhouse spray against citrus mealybug, *Pseudococcus citri*, greenhouse whitefly, *Trialeurodes vaporariorum*, and two-spotted spider mite, *Tetranychus bimaculatus*. The insecticide apparently has selective phytotoxic properties. Ornamental plants treated in these trials are listed and their reactions noted. Damage tended to be more pronounced on the blossoms than on the foliage.

4129. ANON.
Bladaaltjes in siergewassen. **(Leaf eelworms in ornamental plants.)**
Vlugschr. PlZiekt. Dienst Wageningen **3**, 1952, pp. 4, illus., 10 cents.
The herbaceous ornamental host plants of the leaf-attacking eelworms, *Aphelenchoides ritzema-bosi* and *A. fragariae*, are named. *A. fragariae* usually causes leaf spots and blotches which are bordered by the veins. The habits and life cycle of the eelworms are outlined. Control measures include the careful selection of cuttings from healthy " mother " plants, and warm water immersion treatment for 5 min. at 50° C. or 10 min. at 43° C., but this treatment does not apply to begonia and chrysanthemum. The cuttings should be planted in soil known to be non-infested. The application of parathion (at 0·2% of a 20% product) as a spray on young plants will kill eelworms in the leaves. The injuries on a fern frond and on leaves of calceolaria and doronicum are illustrated.

Annual and herbaceous plants.

(*See also* 4200a, c, d, e, f, h, j, l, n, q, s, u, v, z.)

4130. NORTH, C.
The growing of some flower seed crops.
J. nat. Inst. agric. Bot., 1951, **6**: 72-85, bibl. 5.

Cultural notes are given on growing for seed some 30 hardy flower species popular in the U.K.

4131. Ciferri, R.
Microfillia e arricciamento fogliare: una malattia virus-simile dell'antirrino. (Microphylly and leafcurl: a suspected virus disease of antirrhinum.) [English summary 6 lines.]
Riv. Ortoflorofruttic. ital., 1952, **36**: 27-30, illus.
This disease was first noted in June 1951 at the Botanic Gardens of Pavia University after a fairly widespread infestation by *Myzus persicae* in the spring; it affected 30% of the plants. The symptoms are described.

4132. Jefferson, R. N.
Insecticide treatments for the corn earworm on certain flower crops.
J. econ. Ent., 1952, **45**: 137-8, bibl. 1.
Damage to gerberas and asters by *Heliothis armigera* was reduced materially by sprays and dusts of toxaphene, chlordane and DDT.

4133. Vinot, M., and Bouscary, A.
Étude sur l'amélioration de l'oeillet pour la fleur coupée. (Research on the improvement of carnations grown for cut flowers.)
Rev. hort. Paris, 1952, **124**: 703-8, bibl. 5, illus.
Experiments undertaken at the Provence Agronomic Research Centre on the sand culture of carnations for the cut flower industry have been very successful. Details are given of the apparatus (of the so-called lost liquid, constant level and circulatory types) and of the different grades of sand used, and also the formulae and concentrations of the nutrient solutions employed at different phases. Cultural methods are described. Planting of cuttings began on 29 April and harvesting of flowers on 20 October.

4134. Holley, W. D., Wagner, D. L., and Farmer, R.
The response of carnation varieties William Sim and White Patrician to various levels of nitrate and soil moisture.
Colo. St. Flower Grs' Ass. Bull., 1951, No. 26, pp. 1-3, from abstr. in *Bull. N.Y. St. Flower Grs*, 1952, No. 80, p. 8.
Three levels of watering applied on the surface giving 9, 6 and 3 in. of mercury tension gave no significant differences in production. With 3 levels of nitrate supply 40-100 p.p.m. gave higher production than 20-40 p.p.m., which in turn gave higher production than 0-15 p.p.m. It is concluded that nitrate should not be allowed to fall below 20 p.p.m.

4135. Holley, W. D.
Carnation mulching studies 1950-51.
Colo. St. Flower Grs' Ass. Bull., 1951, No. 23, pp. 2-3, from abstr. in *Bull. N.Y. St. Flower Grs*, 1951, No. 74, p. 4.
Five mulching materials applied on 2 carnation varieties did not significantly increase total production, but cotton seed hulls, manure and leaf mould gave significant increases in the number of flowers of highest quality when compared with unmulched plots.

4136. Thomas, W. D., Jr., and others.
The effect of mosaic on the yield and quality of carnations.
Colo. St. Flower Grs' Ass. Bull., 1952, No. 28, pp. 2-4, from abstr. in *Bull. N.Y. St. Flower Grs*, 1952, No. 80, p. 5.
White Patrician and Donna Lee mosaic infected and healthy plants were compared in growth. Mosaic did not affect yield. It hastened the peak cut, increased splitting and decreased stem length and grade.

4137. Shanks, J. B., and Tomczyk, R. A.
Bacterial wilt of carnations as affected by fertilization.
Flor. Exch., 1951, **117**: 26: 10, being excerpt from *Misc. Publ. Md agric. Exp. Stat.* **119.**
Fertilizer experiments with the carnation varieties Northland (resistant) and King Cardinal (susceptible) showed that liming acid soils and the application of superphosphate before planting markedly decreased the number of plants showing symptoms of bacterial wilt caused by *Phytomonas caryophylli*.

4138. Ministry of Agriculture, London.
Chrysanthemums.
Bull. Minist. Agric. Lond. **92**, 3rd edition, 1952, pp. 50, illus., 3s.
This bulletin, which has been revised by the Flowers Group of the National Agricultural Advisory Service, again deals with all aspects of commercial chrysanthemum growing, both outdoor and under glass. It follows the same general lines as the second edition [see *H.A.*, 19: 3299] but has been expanded. The section on the cultivation of mid-season and late-flowering varieties has been much enlarged and there is a new section on cultivation under Dutch-light and other similar portable or permanent structures, a method which is increasing in popularity. Appendices have been added on stopping dates and on the John Innes seed and potting composts. The latter or a similar compost is recommended for stool-beds, as a medium for rooting cuttings and for potting and bedding out rooted cuttings. The National Chrysanthemum Society's 1951 classification of flower types, which now contains 25 sections compared with 11 in 1939, is included, and also a revised list of varieties.

4139. Popham, R. A., and Chan, A. P.
Origin and development of the receptacle of *Chrysanthemum morifolium*.
Amer. J. Bot., 1952, **39**: 329-39, bibl. 13, illus., being *Pap. Dep. Bot. Plant Path. Ohio St. Univ.* **538** and *Contr. Div. Hort., Dom. exp. Fms Serv. Ottawa* **753.**
The principal features of growth in diameter and height of the receptacle of *Chrysanthemum morifolium* are summarized. The "floral induction period" was shown to consist of a "receptacle induction period" and a "floret induction period". The "receptacle induction period" comprises the first 5 days or fewer following exposure of plants to daily short photoperiods. No morphological changes are evident in the vegetative shoot apex during this period. The "floret induction period" includes the succeeding 3 or more days, during which time receptacle initiation occurs, the terminal bud loses its apical dominance, bracts begin differentiating, the peduncle elongates, and

certain changes occur in the zonation of the apex. Floret induction ordinarily occurs on about the 14th day. If receptacle induction occurs and floret induction fails to occur, a " crown bud " is formed. The " crown bud " consists of an unusually enlarged receptacle, devoid of procambial strands, which corresponds in other morphological features to the usual 12th day stage of development. It was inferred that differentiation of procambial strands into the receptacle was somehow initiated by the floret primordia or the mechanism which controls initiation of florets. The mechanism of the phenomenon of apical dominance was suppressed, altered, or destroyed at the level of the highest lateral bud during the floral induction period. Failure of the mechanism does not occur simultaneously throughout the upper end of the shoot but proceeds basipetally. The receptacle was shown to represent a continued but specialized development of the vegetative shoot apex which gradually becomes determinate in growth. [From authors' summary.] [See also *Ibidem*, 37: 476, *H.A.*, 21: 1882.]

4140. Post, K., and Lacey, D. B.
High temperature produces long-day effect on chrysanthemums.
Bull. N.Y. St. Flower Grs, 1951, No. 76, pp. 4-5, 8.

In 1950 and 1951 seven varieties of standard chrysanthemums, planted on July 7, pinched on July 17 and subjected to short days on August 15, were grown under 4 temperature conditions: (1) 90° F. night and day, (2) 90° F. night and 60° F. day, (3) 60° F. night and 90° F. day, and (4) 60° F. night and day. Bud initiation occurred with all temperature combinations, but bud development was prevented in 1950 and much delayed in 1951 by high temperature. Most rapid bud development occurred at 60° F. night an day. Of the dual temperature treatments low night temperature was more favourable than low day temperature. There was considerable variation between varieties in their bud development response to temperature.—Cornell Univ.

4141. Caseby, W. R.
Pests and diseases of the chrysanthemum.
Grs' Digest, 1950, **2**: 2: 22-5.

Advice is given on the control of aphis, earwig, eelworm, capsid bug, caterpillar, leaf miner maggot, midge, rust, mildew and leafspot.

4142. Southey, J. F.
Unusual chrysanthemum eelworm symptoms.
Plant Path., 1952, **1**: 48-9, bibl. 5, illus.

Chrysanthemums attacked by *Aphelenchoides ritzemabosi* in 1950 and 1951 sometimes showed striking distortion of the younger leaves around and below the bud due to ectoparasitic feeding, in addition to the typical symptoms.

4143. Dimock, A. W., and Baker, K. F.
Responses of ethylene-sensitive flowers to ethylene produced by diseased tissues.
Flor. Rev., 1950, **106**: 2754: 27-8, from abstr. in *Bull. N.Y. St. Flower Grs*, 1952, No. 80, p. 5.

Pompom chrysanthemums inoculated with a ray blight fungus, *Mycosphaerella ligulicola*, produced sufficient ethylene to cause " sleepiness " of carnations or " shelling " of snapdragons or calceolarias, when these flowers were enclosed under bell jars with the pompoms. Healthy pompon tissue failed to produce the ethylene response.

4144. Gigante, R.
Una forma di mosaico del geranio. (A **mosaic disease of geranium.**) [English summary 6 lines.]
Boll. Staz. Pat. veg. Roma, 1950 (issued 1952), **8**: 213-19, bibl. 20, illus.

A mosaic disease of *Pelargonium zonale*, characterized by rounded yellowish spots on the leaves but no curling or crinkling, was observed near Rome. In the parenchymatous tissues of the midrib groups of necrotic cells may occur separated from the healthy ones by corky layers. The disease was transmitted only by grafting. Previous literature on mosaic diseases of geranium is reviewed.

4145. Torgeson, D. C.
Observations of verticillium wilt of geranium in Oregon.
Plant Dis. Reptr, 1952, **36**: 51, bibl. 3.

Verticillium albo-atrum has been shown to cause a wilt disease of geranium (*Pelargonium hortorum*). There was no discoloration of the vascular system. Isolates of *V. albo-atrum* from raspberry and peppermint were also found to be pathogenic to geranium.

4146. Dye, D. W.
The effects of chemicals and antibiotic substances on crowngall (*Agrobacterium tumefaciens* (Smith and Townsend) Coun.). Part IV.
N.Z.J. Sci. Tech., Sect. A, 1952, **33**: 5: 104-8, bibl. 7.

Streptomycin and 7 chemical solutions, injected, smeared, and brushed on marigold (*Tagetes patula*) stems at the time of inoculation and on growing galls, all prevented gall formation or greatly reduced the number of galls that developed. " Puratized ", which caused little plant damage, was the only material that gave complete control in both experiments. [Previous papers of this series have been abstracted, *H.A.*, 22: 1354-1356.]—D.S.I.R., Auckland.

4147. National Horticultural Magazine.
Special number. Penstemons.
Nat. hort. Mag., 1951, **30**: 1-82, illus.

The whole of this number of the journal is devoted to accounts, mainly popular, of penstemon species and hybrids with notes on the behaviour of wild and cultivated types in different parts of the U.S.A.

4148. Valentine, D. H.
Studies in British primulas. III. Hybridization between *Primula elatior* (L.) Hill and *P. veris* L.
New Phytol., 1952, **50**: 383-99, bibl. 21, illus.

Experiments on hybridization between the oxlip (*Primula elatior*) and the cowslip (*P. veris*) are described. They have as their aim the clarification of interspecific compatibility, the determination of taxonomic status, and the exploration of the evolutionary history of the species. Special attention has been paid to seed compatibility, i.e. to the nature and amount

of seed set in the first cross; some investigations on the fertility and cytology of the hybrid have also been made. —University of Durham.

4149. Franklin, M. T.
A disease of *Scabiosa caucasica* caused by the nematode *Aphelenchoides blastophthorus* n. sp.
Ann. appl. Biol., 1952, **39**: 54-60, bibl. 3, illus.

Scabiosa caucasica has been found affected by a new species of nematode, *Aphelenchoides blastophthorus*, at Leicester, and has suffered similar damage in Bucks, Lincs, Staffs, Cambs and Hants. The disease causes death or distortion of young inflorescences, and sometimes complete blindness of the plant. Leaves are distorted, thickened and reduced in size. The symptoms often tend to disappear later in the season.

4150. Doutt, R. L.
Biological control of *Planococcus citri* on commercial greenhouse stephanotis.
J. econ. Ent., 1952, **45**: 343-4, bibl. 2.

Results of experiments in California have shown that citrus mealybug, *P. citri*, can be almost completely eradicated from stephanotis by introducing the encyrtid parasite *Leptomastix dactylopii* and coccinellid predator *Cryptolaemus montrouzieri* into the greenhouse.

4151. Kappert, H.
Untersuchungen über den Mechanismus des Immerspaltens bei der Kulturlevkoje (*Matthiola incana*). **(A study of the mechanism of permanent segregation in stocks.)**
Züchter, 1951, **21**: 205-11, bibl. 8.

This paper deals with the genetics of the single and double flower characters which segregate in a ratio of about 1 : 1 in the progeny of single flower stocks.

4152. Kimball, M. H., and Matkin, O. A.
Potash deficiency in stocks.
Bloom. News, 1951, **3**: 8: 4-5, from abstr. in *Bull. N.Y. St. Flower Grs*, 1951, No. 74, p. 4.

Potash deficient stocks in California grew slowly and the leaves turned yellow and later light orange or reddish purple. In young plants recovery occurred in about 10 days following a heavy dressing of K_2O that was watered in, the effect of a single application lasting 4-5 weeks. Older plants in which flower bud development had started did not respond. Analysis of leaf stem juices showed normal plants to contain 2,650 to 3,650 p.p.m. K and severely deficient plants less than 1,100 p.p.m. The plants also responded to N.

Bulbs, tubers, etc.

(*See also* 4200b, k, m, o, p, w, 4201a, 4528.)

4153. Löhr, E.
Photosynthese von *Anemone nemorosa*. **(Photosynthesis of *Anemone nemorosa*.)**
Physiol. Plant., 1952, **5**: 221-7, bibl. 14.

From comparisons made between the values obtained for photosynthesis, respiration and dry matter content in relation to leaf area of *Anemone nemorosa*, the shade plant *Oxalis acetosella* and the light loving plant *Sinapis alba*, it is concluded that *A. nemorosa* is neither a decided shade nor a decided light loving plant. It resembles, however, the typical light loving plants more than the typical shade plants.—Plant physiol. Inst. Univ. Copenhagen.

4154. Smith, L. B., and Schubert, B. G.
Una nueva begonia Argentina. **(A new begonia from Argentina.)** [English abstract 5 lines.]
Lilloa, 1950, **23**: 143-6, illus. [received 1952].

A new species of *Begonia* found in Argentina is described. It is called *B. descoleana* Smith et Schubert nov. sp. and is thought to be very suitable for introducing to cultivation, being similar to *B. cucullata*.

4155. Morrison, B. Y.
Rex begonia seed on sphagnum moss.
Nat. hort. Mag., 1951, **30**: 153-6, illus.

A simple and effective way of raising Rex begonia seedlings on sphagnum moss is described. So long as new moss is used at each sowing there is no risk of damping off.

4156. Horton, F. F.
Short day causes dormancy in tuberous rooted begonias.
Bull. N.Y. St. Flower Grs, 1951, No. 76, p. 3, bibl. 1, illus.

Tuberous rooted begonias remain in flower throughout the year at day lengths of about 14 hrs. Plants in flower in August were subjected to 9-hr. days for 1 to 8 weeks, then cut back and given 14½-hr. days. Two weeks of short photoperiods caused partial dormancy and 3 weeks complete dormancy.—Cornell Univ.

4157. Parker, M. W., and Borthwick, H. A.
Daylength proved vital factor in gladiolus flowering.
Flor. Exch., 1951, **117**: 26: 9, 38-40, bibl. 7.

Results of trials at Beltsville, Maryland, showed that short photoperiods (12 hrs) applied to gladioli induced earlier flowering, fewer flowers per spike and shorter spikes than long photoperiods (15 hrs). A short photoperiod supplemented by artificial illumination for ½ to 1½ hrs near midnight produced effects similar to those of a long photoperiod. For maximum response it was necessary to start the treatment as soon as the plants emerged from the soil. Varieties were found to differ slightly in their reaction. Interrupting the dark period with artificial light may improve flower quality and reduce blindness in gladiolus grown in the southern U.S. during winter.

4158. Calvino, E. M.
Un caso raro di formazione di cormi ascellari in gladioli ibridi. **(A rare case of the formation of axillary corms in hybrid gladioli.)** [English summary 8 lines.]
Riv. Ortoflorofruttic. ital., 1952, **36**: 63-6, illus.

The spontaneous formation of adventitious corms, normal in shape, structure and polarity, in the leaf axils of three stems of gladiolus is reported. The causes might be variation in the concentration gradient of soluble sugars, hormone variation or alteration in the chemical reaction and osmotic pressure. Inulin, not normally found in the gladiolus, was found in considerable quantity in the peduncle of the corm and

in the node of the flower stem at which the peduncle arose.

4159. Brierley, P.
Evidence on the significance of cucumber mosaic and tobacco ringspot viruses in gladiolus.
Plant Dis. Reptr, 1952, **36**: 48-50, bibl. 8, illus.

The viruses of bean yellow mosaic, cucumber mosaic, and tobacco ringspot may occur together in the gladiolus variety, High Finance, without causing marked stunting or crippling of the flower, thus indicating that these viruses have no primary causal relation to the more damaging, unidentified diseases of gladiolus.

4160. Slatter, E. M.
The culture of iris embryos on nutrient agar.
Kew Bull., 1950, No. 3, pp. 425-30, bibl. 4, illus. [omitted in error from *H.A.*, Vol. 21].

Experiments made at Kew are described which resulted in the development of a successful technique for germinating excised embryos of certain bearded iris hybrids on nutrient agar. Among the aspects examined were materials for the surface sterilization of the seeds, methods of reducing contamination with fungi and bacteria, the concentration and degree of firmness of the agar, types of container, and treatment after transplanting. The agar method gave 90% germination within a month, whereas whole seed sown in pans showed no germination for 4 months and only 68% after 12 months. A sand and sphagnum medium was unsatisfactory for culturing embryos. Further investigations are needed to determine why embryos from some hybrids failed to germinate and also to test other culture media with particular reference to the suppression of bacteria.

4161. Ark, P. A., Starr, M. P., and Sutton, D. D.
Bacterial chalk rot of yellow and pink callas.
Phytopathology, 1952, **42**: 320-2, bibl. 15.

The organism causing chalk rot of the corms of yellow calla (*Zantedeschia elliottiana*) and pink calla (*Z. rhamanni*) is probably *Erwinia carotovora* which causes soft rot of white callas (*Z. aethiopica*). The disease is very destructive and is a limiting factor in growing callas for corms. It is most severe at high temperatures and high soil moisture. Chemical treatments did not control it, but heavy treatment of the soil with cow manure reduced its incidence considerably.

4162. Mezzetti, A.
Il marciume del pedale della calla prodotto dal *Bacterium aroideae* (Town.) Stapp in Italia. **(Basal rot of the calla lily produced by *Bacterium aroideae* in Italy.)** [English summary 7 lines.]
Boll. Staz. Pat. veg. Roma, 1950 (issued 1952), **8**: 45-58, bibl. 10, illus.

A basal stem rot, caused by *Bacterium aroideae*, on the calla lily, *Zantedeschia aethiopica*, grown under glass in certain parts of Italy is described. In preliminary trials disinfection of the seed and soil with formalin has given promising results. When rhizomes were treated with Semesan Bel and then with formalin growth was retarded.

4163. Roberts, A. N., Stephenson, R. E., and Wadsworth, S. E.
Effectiveness of lime in preventing scorch of Croft lilies during forcing.
Flor. Exch., 1951, **117**: 17: 14-15, 23, bibl. 2, illus.

Croft lilies forced at the Oregon Agricultural Experiment Station in two soil types, pH 5·0 and pH 6·2, without fertilization produced an equal amount of leaf scorch. Applications of a combined fertilizer consisting of N-P-K-S, necessary for the production of best quality Croft foliage, increased the incidence of scorch, but liberal amounts of lime mixed with the potting soil counteracted this. Mn and Al treatments also induced scorch, but the effects were again largely neutralized by lime.

4164. Andison, H., and Cram, W. T.
Narcissus bulb fly control with methyl bromide fumigation and its effect on the flower production of greenhouse-grown narcissus bulbs.
Sci. Agric., 1952, **32**: 93-8, bibl. 16, illus., being *Contr. Div. Ent., Sci. Serv., Dep. Agric. Ottawa* **2839**.

There is a wide margin of safety between methyl bromide dosages that give complete kill of narcissus bulb fly, *Lampetia equestris*, larvae and those dosages that injure the bulbs. The dosage of 3 lb. per 1,000 cu. ft. for 4½ hrs. at 60° F. gave as high mortality at the Dominion Entomological Laboratory, Victoria, B.C., as the standard treatment of 3 lb. for 4 hrs. at 70° F., recommended for the Pacific Northwest. Differences in flower production and flowering dates were not apparent between untreated King Alfred bulbs and those treated at somewhat excessive dosages. A 24-hr. treatment of 3 lb. at 60° F. rendered the bulbs useless for flower production.

4165. Hastings, R. J., Bosher, J. E., and Newton, W.
The revival of the narcissus bulb eelworm, *Ditylenchus dipsaci* (Kuhn) Filipjer, from sublethal hot water treatments.
Sci. Agric., 1952, **32**: 33-6, bibl. 6.

Eelworms comprising the eelworm wool of narcissus bulbs become, with age, less resistant to hot water treatment. Both the rate of recovery and the percentage of eelworms that recovered were lower in a 376-day-old eelworm sample than in a 40-day-old and a 25-day-old sample. There appears to be a direct relationship between the severity of injury and the time required to revive heat-injured eelworms. Eelworms given a one-hour immersion made maximum recovery in approximately four days; those given a two-hour immersion, in five days; and those given a three-hour immersion, in six days. Recovery by eelworms that received two successive immersions, one week apart, was more rapid after the second immersion than after the first. Eelworms in the dry eelworm wool condition were highly resistant to heat treatment and made maximum recovery on the second day after treatment, even when the treatment was of five-hour duration. [Authors' summary.]—Dom. Lab. of Plant Path., Saanichton, B.C.

4166. Theau, A.
Le *Strelitzia reginae*. (***Strelitzia reginae.***)
Rev. hort. Algér., 1952, **56**: 21-8.
This is an account of *Strelitzia reginae*, the bird of paradise flower, cultivated under glass in Europe, but grown in the open in the coastal regions of Algeria. Four varieties of *S. reginae* and several other *Strelitzia* spp. are briefly described. Notes are given on propagation by division and by seed.

4167. Bensa, S.
Miglioramento della *Strelitzia reginae* per selezione di forme ottenute da seme. (**Improvement of *Strelitzia reginae* by seedling selection.**) [English summary ¾ p.]
Ann. Sper. agrar., 1952, **6**: 33-52.
Selection work on *Strelitzia reginae*, the Bird of Paradise flower, has been in progress at the Orazio Raimondo Floricultural Experimental Station, San Remo, since 1938. Among 100 plants there exist 2 free-flowering individuals that have produced an annual average of 9·6 and 7·5 inflorescences respectively in the first 8 years. It will be possible to initiate clones from these by division. Further selection will be aided by the discovery of a number of characters correlated with high flower productivity.

4168. Uschdraweit, H. A.
Eine Viruskrankheit bei Treibtulpen. (**A virus disease of forced tulips.**)
Reprinted from *Gartenwelt*, 1952, No. 10, p. 1, illus.
The necrotic disease of forced tulips caused by tobacco necrosis viruses and described earlier by B. Kassanis, Rothamsted (see *H.A.*, 19: 2374), has now been observed in Berlin.

4169. Vlag, A. F.
De bestrijding van het vuur in tulpen (*Botrytis tulipae* Lind.). (**The control of tulip mould or fire.**) [English summary ½ p.]
Meded. Dir. Tuinb., 1952, **15**: 101-8, illus.
Favourable results on the control of tulip fire by spraying were obtained with the ferric dimethyl dithiocarbamates, Fermate, Aafertis, Liroferm, and Trifungol. Among tetra methyl thiuram disulphide preparations, Tripomol and Fernide were superior to Tulisan. A concentration of 0·4% is suggested for the ferric carbamates and 0·5% for the TMTD sprays. Applications of Dithane Z78 at 0·2% produced healthy plants.

4170. Husz, B., and Podhraszky, J.
A vészes tulipánfoltosság Magyarországon. (***Botrytis tulipae* in Hungary.**) [French and Russian summaries 4 lines each.]
Agrártud. egy.,* 1950, **1**: 136-9, bibl. 10, illus. [received 1952].
A description is given of the disease which first assumed serious proportions on tulips in Hungary in 1950. For control destruction of infected plant material and soil disinfection with 1½ l. of 40% formalin in 100 l. per 100m² are recommended.

* Formerly *Bull. Fac. Hort. Buda.*

Lawns.

4171. Sports Turf Research Institute and General Electric Co. Ltd.
Electrical soil warming as an anti-frost measure for sports turf.
J. Sports Turf Res. Inst.,* 1951, **8**: 25-44.
Experiments conducted over 3 winters at the St. Ives Research Station, Bingley, England, have shown that electrical soil warming efficiently managed can be relied upon to ensure soft turf however hard the frost. The tabulated results presented give a fairly complete picture of the various tests made. The procedure adopted and apparatus used are well illustrated by charts and photographs. Installation and operational costs of soil warmers for various areas of turf are given.

4172. Klomparens, W., and Vaughn, J. R.
The correlation of laboratory screening of turf fungicides with field results.
Quart. Bull. Mich. agric. Exp. Stat. 1952, **34**: 425-35, bibl. 7, illus., being *Contr. Dep. Bot. Plant Path. Mich. St. Coll.* **52-6**.
Of the materials tested in laboratory trials in Michigan, the relatively new compound Vancide 51 (dimethyldithiocarbamic acid plus 2-mercaptobenzothiazole) warrants testing under field conditions against *Helminthosporium*. Tat-C-Lect (phenyl mercuric acetate), an excellent inhibitor in the laboratory, was found to be of little value in the field, but Actidione (cycloheximide) has proved very effective.

4173. Ludbrook, W. V., and Brockwell, J.
Control of dollar spot of turf in Canberra, A.C.T.
J. Aust. Inst. agric. Sci., 1952, **18**: 39-40.
Fortnightly applications of a 0·1% aqueous solution of PACA (phenyl-amino-cadmium acetate) at the rate of 50 gal. per 600 sq. yd. effectively control dollar spot (*Sclerotinia homoeocarpa*) on the greens of the Royal Canberra Golf Club.

Orchids.

(*See also* 4200r, y.)

4174. Jensen, D. D.
Virus diseases of orchids.
Calif. Agric., 1952, **6**: 2: 7, 15-16, illus.
For the first article with this title see *H.A.*, 22: 2892. In the present paper symptoms are described and illustrated of mosaic of *Dendrobium*, etch of *Laelia*, mosaic of *Lycaste*, diamond spot of *Miltonia*, ringspot of *Odontoglossum*, mosaic of *Oncidium*, ringspot of *Stanhopea* and ringspot of *Vanda*. Experimental transmissions are reported in some cases.

4175. Murakishi, H. H.
Transmission of leaf mosaic associated with color break in the flowers of *Dendrobium superbum* Reichb. f.
Phytopathology, 1952, **42**: 339-40, bibl. 2, illus.
A leaf mosaic and a blossom colour break of *Dendrobium superbum* (the "Honohono" orchid) have been observed in Hawaii for many years. The symptoms are yellowish streaks between the veins

* Formerly *J. Bd Greenkeep. Res.*

sometimes accompanied with necrotic streaks; they are most pronounced on young shoots. The relationship of the virus to other orchid viruses has not yet been determined.

4176. Murakishi, H. H.
A mosaic of *Vanda* orchids.
Phytopathology, 1952, **42**: 178-82, bibl. 6, illus.

Vanda mosaic virus causes white streaking and sometimes necroses in flowers of *Vanda* Miss Joaquim and also systemic mottling, purpling and leaf malformations. Infected plants tend to be stunted and to produce fewer flowers than normal. The virus is disseminated by cuttings. Quarantine and eradication measures have been in effect since it was found in 1950 and there have been no new outbreaks. The virus affects only species of the genus *Vanda* and an intergeneric hybrid (*Arachnis hookeriana* × *Vanda sanderiana*), and it could not be transmitted to a number of other plants tested. It is juice-transmissible to *Vanda* by needle punctures. Of 4 aphids tested none transmitted the virus.—Hawaii agric. Exp. Stat.

4177. de Figueiredo, E. R., Jr.
Uma nova praga das Orquidáceas: *Tenthecoris figueiredoi* Carvalho, 1950 (Hemiptera, Miridae, Bryocorinae). **(A new pest of orchids: *Tenthecoris figueiredoi* Carvalho, 1950.)** [English abstract 4 lines.]
Arq. Inst. biol. S. Paulo, 1950/51, **20**: 249-53, bibl. 1, illus.

In 1950 a new hemipterous pest of orchids was found [in Brazil] and was given the name of *Tenthecoris figueiredoi*. In this paper its habits and life history are described and control measures indicated. Unlike the well-known *T. bicolor*, it attacks *Dendrobium*, *Gomeza*, *Oncidium* and *Newtonia* and has not been observed on *Laelia* or *Cattleya*. Good control has been obtained with Gesarol A (5% DDT) at the rate of 1 kg. in 100 l. water, and with Rhodiatox (diethyl-paranitrophenyl thiophosphate), 1 : 5,000.

Roses.

4178. Buck, G. J.
Easier winter care of roses.
Ia Fm Sci., 1951, **6**: 54-5, illus.

Boxes placed over rose bushes, filled with coarsely-ground corn cobs and covered with Kraft paper are shown to give better winter protection than the standard method of soil mound plus litter mulch. The cover should be applied after growth has ceased but before the cold weather sets in, and removed as early in the spring as possible to prevent premature leafing.

4179. Anon.
A promising new material for both powdery mildew and the 2-spotted spider mite.
Flor. Rev., 1950, **106**: 2753: 24-6, from abstr. in *Bull. N.Y. St. Flower Grs*, 1952, No. 80, p. 5.

Karathane, a wettable powder containing 25% 2 capryl 4, 6 dinitro phenyl crotonate, when sprayed on rose plants at the rate of ½ pound per 100 gal. water controlled powdery mildew with little injury to the plants. Parathion-resistant 2-spotted spider mites and eggs were also killed.

4180. Fjelddalen, J., and Daviknes, T.
Veksthusspinnmidder resistente mot thiofosformidler funnet i Norge. **(Glasshouse red spider resistance to parathion in Norway.)** [English summary ½ p.]
Reprinted from *Gartneryrket*, 1952, No. 13, pp. 56, bibl. 7.

After two years of frequent applications of parathion the highest kill of red spider mite (*Tetranychus althaeae*) obtained in a rose glass house was 15-20%. Smoke tablets of tetraethyl dithiopyrophosphate and spraying with the systemic insecticides Pestox and Systox gave good control of the resistant mites.

4181. Ridgway, H. W.
Aerosols for control of pests in the greenhouse.
Flor. Exch., 1951, **117**: 25: 10, 42.

The advantages and limitations of aerosols containing parathion, dithio, DDT, and TEPP are briefly discussed. For the control of red spider mites on roses K6451, Pestox and Systox were found to be effective, but the latter two are not yet available in the U.S. pending further information on their toxicity to man. Smoke aerosols of dithio and parathion are now in use.

Other trees and shrubs.

(*See also* 4200g, i, m, t, 4201b, 4549.)

4182. Fox, W.
Tree and shrub screens.
J. roy. hort. Soc., 1952, **77**: 280-7, illus.

Ornamental plants suitable for screening factories and as windbreaks for housing estates and cultivated land in England are discussed.

4183. Spitta, M. W.
Highway planting in practice.
Road International, Spring 1951, No. 2, pp. 36-43, illus.

Problems associated with the planting of trees and hedges along roadsides and in the centre of two-lane highways to reduce dazzle are discussed. Suggestions made refer particularly to Britain, but some experiences gained in other countries are mentioned.

4184. Fillmore, R. H.
Review of woody plant propagation.
Amer. Nurserym., 1951, **94**: 11: 7-8, 65-6, and 12: 10-11, 42-3, 55, illus.

Methods of grafting, budding, rooting cuttings, and propagation by seed, air layers and division of fruit and ornamental trees and bushes are discussed, with notes on compatibility, dwarfing rootstocks, root development, growth media and growth promoting substances.

4185. Wells, J. S.
Pointers on propagation. Further experiences with humidification.
Amer. Nurserym., 1951, **94**: 12: 12-14, illus.

After the good results obtained with magnolia and other softwood cuttings [see *H.A.*, 21: 2879] *Hydrangea hortensis* and *Ilex bullata* cuttings were successfully rooted with the aid of humidification. Azalea cuttings planted from July onwards in 50% peat and 50% sharp sand and maintained at a constantly high humidity began to root in 2 weeks, and in 5 weeks

many batches were ready for transplanting. Doubling the number of nozzles used in the earlier trials gave better results.

4186. KERR, T. W., JR.
Further investigations of insecticides for control of insects attacking ornamental trees and shrubs.
J. econ. Ent., 1952, **45**: 209-12, bibl. 6, being *Contr. R.I. agric. Exp. Stat.* **780**.
During trials conducted in 1951 on Rhode Island nicotine sulphate and lindane were most effective against the balsam twig aphid, *Mindarus abietinus*, and the Cooley spruce gall aphid, *Chermes cooleyi*; 50% DDT, 50% methoxychlor and lead arsenate against willow sawfly, *Nematus ventralis*, and eastern tent caterpillar, *Malacosoma americanum*; and 50% DDT and nicotine sulphate against euonymus scale, *Unaspis euonymi*, and another scale insect, *Leucaspis japonica*.

4187. GAMBRELL, F. L., AND HEIT, C. H.
Soil chemicals in evergreen seedbeds.
Amer. Nurserym., 1952, **95**: 10: 9-10, illus., being *J. Pap. N.Y. St. agric. Exp. Stat.* **895**.
Trials conducted at Geneva, N.Y., have shown that DDT, BHC and chlordane do not affect the germination of Austrian pine seeds. On lifting the following spring, plants raised in the bed receiving DDT produced more vigorous root growth and less root rot than the controls. Chlordane, however, retarded growth somewhat, and the BHC treatment resulted in an almost complete loss of seedlings.

4188. WELLS, J. S.
Propagation and production of hardy azaleas.
Amer. Nurserym., 1952, **95**: 6: 7-9, 57-61, and 7: 12-14, 68-70, illus.
The azaleas discussed are only those belonging to the evergreen group. Propagation by cuttings is most commonly used, and is described in detail. Azaleas require an acid soil with a pH between 4·8 and 5·2 containing adequate humus. They need only a moderate amount of nutrients, particularly when small, but adequate water and shade are essential for the establishment of young plants. They can be grown with moderate success in areas where the natural soil conditions are alkaline if the beds are raised and the pH of the soil is brought down sufficiently.

4189. DE CLEENE, E. T.
***Azalea indica* forcing and notes.**
Grs' Digest, 1951, **3**: 1: 6-9.
Three types of Belgian-grown *Azalea indica* can be forced at 60–68° F. for Christmas flowering, viz. pot-grown Petrick varieties imported in November and indoor and outdoor bed-grown plants of all varieties imported in mid-October and September to mid-October respectively. Warmth around and below the pots is essential. A constant heat is best but the temperature can be steadily increased until the buds begin to break and then gradually reduced again. Plants must be soaked as soon as received. After potting, watering should be sparing for 10 days, especially in the case of indoor and outdoor bed-grown plants, until root growth begins, when it can be increased. No manuring is required.

4190. PRITCHARD, A. E.
Brachyrhinus weevils.
Calif. Agric., 1952, **6**: 4: 5, 16, illus.
The grubs of several *Brachyrhinus* spp. often kill certain nursery shrubs and other ornamentals. In a small preliminary trial chlordane, dieldrin and toxaphene applied to composted soil in a lath-house of azaleas, first in early April and again in early May, effectively controlled emerging weevils of *B. sulcatus*. The azalea foliage was also sprayed to determine tolerance, but no spray injuries were observed.

4191. WOLF, F. T., AND WOLF, F. A.
Pathology of camellia leaves infected by *Exobasidium camelliae* var. *gracilis* Shirai.
Phytopathology, 1952, **42**: 147-9, bibl. 6, illus.
Exobasidium camelliae var. *gracilis* causes a disease of *Camellia sasanqua* characterized by enlargement of all leaves on new shoots and exfoliation of the lower epidermis and contiguous tissues; both hypertrophy and hyperplasia of host cells are involved.—Vanderbilt Univ., Nashville, Tennessee.

4192. JAMES, M. O., AND PLAKIDAS, A. G.
Two new phytophthora diseases of ornamental hibiscus.
Phytopathology, 1952, **42**: 144-6, bibl. 11, illus.
A foot rot and a leaf and stem blight of *Hibiscus rosa-sinensis* and *H. schizopetalus* are caused by *Phytophthora cactorum* var. *applanata* and *P. palmivora* respectively. Foot rot was found to be widespread in Louisiana both in nurseries and in private gardens. Leaf and stem blight was found chiefly in greenhouses and lath houses in nurseries where vegetative propagation by marcottage was practised and where high humidities were maintained by frequent syringing.—La State Univ.

4193. STUART, N. W.
Greenhouse hydrangeas.
Flor. Rev., 1951, **109**: 2813: 37-40, from abstr. in *Bull. N.Y. St. Flower Grs*, 1952, No. 80, p. 8.
Investigations on cold storage prior to forcing and on fertilizers are reported. In the latter N increased the intensity of pink in the flowers, low N producing lavender flowers. A 4–12–4 fertilizer gave muddy colours, K gave bluish and P pink flowers. The brightest pink flowers were produced even at a pH of 5·1 with a good supply of N and P.

4194. STUART, N. W.
Three important factors in hydrangea production—artificial light, storage and fertilizers.
Flor. Exch., 1951, **117**: 22: 14-15, 42, bibl. 5, illus.
The experiments described show that for earliest bloom from naturally matured hydrangeas a minimum storage period of 5-6 weeks at 35-40° F. is necessary. In a preliminary trial artificial illumination of the plants during cold storage induced earlier flowering, but the treatment is considered uneconomical. To finish maturing plants with artificial light is, however, thought to be practicable and this is being studied further. In fertilizer tests the addition of N resulted in slightly earlier bloom, larger flowers and taller plants; P or K alone did not appreciably affect growth. A combination

of N and P was found favourable for pink flower development; P should be omitted when blue flowers are desired.

4195. Duvernay, J.-M.
Les lilas. Étude du genre *Syringa*. **(The lilacs. A study of the genus *Syringa*.)**
Jardins Fr., 1951, **5**: 238-52, illus.
Brief notes are given on the 30 species of *Syringa* and their cultivation. The chief single and double varieties of the common lilac (*Syringa vulgaris*) are listed, and also the species and synonyms of the whole genus.

4196. Schmidt, G.
Beobachtungen an dem Fliederknospenrüssler (*Otiorrhynchus lugdunensis* Boh.). **(Observations on the lilac bud weevil *Otiorrhynchus lugdunensis*.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1952, **4**: 81-2, bibl. 8, illus.
The lilac bud weevil and its habits are described. Other hosts mentioned are apple, raspberry, vine and rose. The weevils can be collected in wood wool wrapped round the stems, but this method is more effective if the soil is previously treated with a hexa-preparation or a combination of hexa and DDT.—Biologische Zentralanstalt Berlin-Dahlem.

4197. Post, K., and Mastalerz, J.
Poinsettias and low soil temperature.
Bull. N.Y. St. Flower Grs, 1952, No. 80, p. 4, bibl. 3, illus.
Poinsettias, variety Albert Ecke, subjected to a soil temperature of 40° F. for 10 days in two trials suffered 100% leaf drop (excluding coloured bracts). When soil temperature was kept at 40° F. for 4 and 2 days, few and no leaves were shed. No leaves were shed when plants were subjected to soil temperatures of 50°, 60° or 80° F. for up to 10 days.

4198. Ribaldi, M.
Su di una caratteristica maculatura fogliare del ligustro (*Ligustrum vulgare* L.). **(A characteristic leaf spotting in privet (*Ligustrum vulgare* L.).)** [English summary 5 lines.]
Ann. Sper. agrar., 1952, **6**: 95-100, bibl. 5, illus.
A description is given of the macroscopic and microscopic characters of *Ramularia ligustrina*, a fungus which causes leaf spotting in privet and which was first reported in Italy in 1951.

4199. Hayes, S. F., Keenan, J., and Cowan, J. M.
A survey of the anatomy of the rhododendron leaf in relation to the taxonomy of the genus.
Notes roy. bot. Gdn Edinb., 1951, **21**: 1-34, bibl. 4, illus.
The leaves of 587 species of *Rhododendron* have been examined in order to ascertain whether or not the leaf anatomy will afford any criteria of significance in the taxonomy of the genus. A summary of earlier work is given. The anatomical characters of the leaf which have a diagnostic value are found to be: 1. The number of cell layers in the dermal layer. 2. The relative cell size of a multiple epidermis. 3. The thickness of the cuticle. 4. The presence or absence of water tissue. 5. The presence or absence of epidermal papillae. The anatomy of the leaf, although not of fundamental significance, furnishes criteria which are clearly of value in the classification of the genus. [From authors' summary.]

Noted.

4200.

a Andrewes, C. H.
***Monophadnoides waldheimii* Gimm. (Hym. Tenthredinidae) a pest on garden geums.**
Ent. mon. Mag., 1952, **88**: 47.

b Baruah, H. K., and Baruah, P.
On the biology of *Sclerotium delphinii* Welch attacking garden lilies.
Sci. and Cult., 1952, **17**: 304-5, bibl. 2, illus.

c Baxter, J. W., and Cummins, G. B.
A monograph of species of *Puccinia* occurring on *Salvia* in North America.
Lloydia, 1951, **14**: 201-30, bibl. 13, illus.

d Beaumont, A.
Petunia diseases.
Gdnrs' Chron., 1952, **131**: 141.

e Buell, K. M.
Developmental morphology in *Dianthus*. I. Structure of the pistil and seed development.
Amer. J. Bot., 1952, **39**: 194-210, bibl. 41, illus.

f Cohen, M.
***Contarinia chrysanthemi* Kieffer—a new gall midge pest of shasta daisy.**
Plant Path., 1952, **1**: 51-3, bibl. 5, illus.

g Davidian, H. H.
New rhododendrons from Nepal.
Notes roy. bot. Gdn Edinb., 1952, **21**: 99-100.
R. cowanianum Davidian, sp. nov., and *R. lowndesii* Davidian, sp. nov.

h Dunn, S., and Holley, W. D.
The effect of temperature, soil reaction, and soil nutrients on the growth of gerbera in the greenhouse.
Stat. Circ. N.H. agric. Exp. Stat. **69**, 1944, pp. 8, bibl. 1 [received 1952].

i Dutt, M.
Chromosome numbers in some ornamental jasmines.
Sci. and Cult., 1952, **17**: 527-8, bibl. 5.

j Ernst, A.
" Maternal hybrids " nach interspezifischen Bestäubungen in der Gattung *Primula*. 2. Sektion *Farinosae*. **(Maternal hybrids from interspecific pollinations in the genus *Primula*. 2. Section *Farinosae*.)**
Arch. Klaus Stift., 1951, **26**: 187-322, bibl. 4 pp., illus.

k Fernandes, A.
La meiose chez *Narcissus poetaz* " Alsace ". **(Meiosis in *Narcissus poetaz* var. Alsace.)**
Genet. Iber., 1950, **2**: 149-74, bibl. 31, illus. [received 1952].

l Glendenning, R.
***Psila nigricornis* Meig. (Diptera: Psilidae), a new pest of possible economic importance.**
Canad. Ent., 1952, **84**: 107.
On chrysanthemum in British Columbia.

m GOODEY, J. B.
Investigations into the host ranges of *Ditylenchus destructor* and *D. dipsaci*.
Ann. appl. Biol., 1952, **39**: 221-8, bibl. 19, illus.
Including hop, lilac, begonia and gladiolus.

n HEYWOOD, V. H.
***Chrysanthemum praeteritum* Horwood: its provenance, taxonomy and allied species.**
Notes roy. bot. Gdn Edinb., 1952, **21**: 53-60, bibl. 4.

o IRMSCHER, E.
Some new Chinese species of *Begonia*.
Notes roy. bot. Gdn Edinb., 1951, **21**: 35-45.

p JAIN, A. C., AND NEMA, K. G.
Blossom blight of dahlia.
Curr. Sci., 1952, **21**: 71-2, bibl. 1.
The organism described is believed to be *Choanephora infundibulifera*.

q JANAKI AMMAL, E. K.
The story of *Primula malacoides*.
J. roy. hort. Soc., 1952, **77**: 287-90, being *Contr. Cyt. Dep. R.H.S. Gdns* **6**.

r KAMEMOTO, H.
Polyploidy in cattleyas.
Amer. Orchid Soc. Bull., 1950, No. 19, pp. 366-73, from abstr. in *Bull. N.Y. St. Flower Grs*, 1952, No. 80, p. 5.

s LANGVAD, B.
Systematische Studien in *Petunia hybrida* Hort. **(Taxonomic studies on *Petunia hybrida*.)**
Agri hort. Genet., 1952, **10**: 19-49, bibl. 24, illus.

t MUKERJEE, S. K., AND MURTY, V. V. S.
Chemical examination of the flowers of *Acacia leucophloea* Willd.
J. sci. industr. Res., India, 1952, **11B**: 125-6, bibl. 1.

u NEWHALL, A. G.
Chrysanthemum foliage injury with methyl bromide.
Bull. N.Y. St. Flower Grs, 1951, No. 73, p. 4.
Fumes from Iscobrome applied to adjoining soil.

v PRASAD, N.
Fire blight of cosmos—a bacterial disease incited by *Erwinia cosmovora* n. sp.
Curr. Sci., 1952, **21**: 17, bibl. 1.
On *Cosmos bipinnatus*.

w PRISZTER, S.
Amaranthus-vizsgálatok II. Az Amaranthaceae család és tagjainak általános jellemzése. (***Amaranthus* studies II. Characteristics of the family Amaranthaceae and its species.)** [French and Russian summaries 2½ and 2 pp. respectively.]
Agrartud. egy.,* 1950, **1**: 56-82, bibl. 65 [received 1952].

x SCHREAD, J. C.
Insect control in landscape plantings.
Amer. Nurserym., 1952, **95**: 11: 10, 46-50.
For lawns, trees and shrubs.

y SENARATNA, J. E.
The orchid *Vanda tessellata* (Roxb.) Hood.
Trop. Agriculturist, 1951, **107**: 181, plus coloured plates.
Showing variations in flower colour found in Ceylon.

z SPARRE, B.
Systematical and nomenclatorial studies on the genus *Viola*. II. Further annotations on the section *Chilenium*. [Spanish summary 10 lines.]
Lilloa, 1950, **23**: 347-64, illus. [received 1952].

4201.

a TOMLINSON, J. A.
Root rot of crocus caused by *Pythium ultimum*.
Plant Path., 1952, **1**: 50, bibl. 1, illus.

b TRIVEDI, B. S., AND NIGAM, P. N.
Some abnormal flowers of *Bauhinia acuminata* Linn.
Sci. and Cult., 1952, **17**: 438-9, bibl. 3, illus.

c WIJEWANTHA, R. T.
Some preliminary observations on the genus *Nepenthes* in Ceylon.
Ceylon J. Sci., Sect. A, 1952, **12**: 245-7, bibl. 5, illus.
The variable species *N. distillatoria* is the only species in Ceylon.

* Formerly *Bull. Fac. Hort. Buda*.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 3349, 3366.)

4202. MALAN, E. F.
Subtropical fruits in South Africa.
Fmg S. Afr., 1952, **27**: 177-8, 190.
A brief, partly historical, account is given of the subtropical and tropical fruits grown in South Africa. Among a collection of 74 mango varieties at Nelspruit the most promising appear to be Peach and Sabre (fibrous) and Aman Dusailri, Extrema and several so-called Brooks types (non-fibrous). Among 27 litchi varieties the Mauritius type is still considered the best. The numbers of trees or areas planted are tabulated for 1951 and earlier years for these fruits and for pecans, avocadoes, papaws, guavas, pineapples, granadillas [passion fruit] and bananas; all show substantial increases in the past 5 years.

4203. PY, C.
Introduction de jeunes arbres fruitiers tropicaux en Guinée. **(The introduction of young tropical fruit trees to French Guinea.)**
Fruits d'Outre Mer, 1952, **7**: 77-80, illus.
In 1950 IFAC introduced 152 young tropical fruit trees into French Guinea from the U.S.A. The

species were avocado pear, *Casimiroa edulis*, mango, carambola, tamarind, loquat, litchi and guava. Two months after final planting out only 5 of the 152 plants had been lost. The types of cases in which the plants were transported are described.

4204. VAN DER MEULEN, A.
The modified Forkert method of budding.
Fmg S. Afr., 1952, **27**: 289-90, bibl. 3, illus.
The modified Forkert method is described with the aid of illustrations. At the Subtropical Horticultural Research Station, Nelspruit, it has given much better results than other methods of budding in the top-working of male tung trees and the propagation of mangoes and pecans.

4205. LEME, J., JR.
A vitamina C em algumas plantas brasileiras e exóticas. **(Vitamin C content of some native and exotic fruits of Brazil.)** [English abstract ¾ p.]
Rev. Agric. Piracicaba, 1951, **26**: 319-30, bibl. 15.
The results of vitamin C determinations on 33 species of fruit, temperate, sub-tropical and tropical, are recorded. They showed that the fruits of *Briota acida*, *Bromelia antiacantha* and *Aegle marmelos* are as rich in ascorbic acid as the sweet orange. They contained from 65 to 108 mg. ascorbic acid per 100 g. fruit. The Kei apple (*Aberia caffra*) contained up to 300 mg. per 100 g. The Barbados cherry (*Malpighia glabra*) was found to be extraordinarily rich in ascorbic acid, containing from 560 to 1,490 mg. per 100 g. Green fruits of this species were richer than ripe ones, and the amount of ascorbic acid was inversely proportional to fruit size. As fruits from different trees varied considerably in their ascorbic acid content, it should be possible to obtain clones rich in vitamin C by selection. Attention is drawn to the horticultural value of each type of tree.—Univ. São Paulo, Brazil.

4206. ZENTMYER, G. A., AND SCHROEDER, C. A.
Resistance of subtropical plants to *Phytophthora cinnamomi*.
Yearb. Calif. Avocado Soc. for 1951, pp. 105-6, illus.
Results of trials on seedlings of macadamia nut, two species of persimmon, cherimoya, and sweet and sour orange indicate that all the above plants are highly resistant, if not immune, to the avocado root rot disease.

Avocadoes.

(*See also* 4302h, q, x, y.)

4207. (CONDIT, I. J.)
Avocado bibliography.
Yearb. Calif. Avocado Soc. for 1951, pp. 124-7.
Sixty-seven further references are added to the main bibliography on avocado [see *H.A.*, 21: 3091].

4208. BENSA, S.
L'aguacate in Italia. **(The avocado in Italy.)**
Ital. agric., 1952, **89**: 169-73, illus.
Persea drymifolia could be grown commercially in the warmer parts of Italy. Although usually raised from seed it can easily be budded, young plants budded in their 1st or 2nd year beginning to yield after 4-5 years and mature trees 18-20 months after budding. Planting is done at 7-8 m. square. No systematic pruning is required but only maintenance of a pyramidal form. Spring cultivation of the soil, organic-chemical manuring every 2-3 years and periodical watering are desirable. Evening spraying of leaves and branches with water is beneficial in dry areas.

4209. FROLICH, E. F.
Rooting Guatemalan avocado cuttings.
Yearb. Calif. Avocado Soc. for 1951, pp. 136-8, bibl. 3, illus.
A method is described which, although not considered commercially practical, proved to be very successful in rooting cuttings of Guatemalan avocado varieties. Essentially it consists of obtaining cuttings from stems, the bases of which have at no time been exposed to light or low humidity. [Author's summary.]

4210. SCHNACKENBERG, R. A.
The economic feasibility of planting tip grafted avocado trees.
Yearb. Calif. Avocado Soc. for 1951, pp. 188-208, bibl. 37.
Data are presented showing that while tip grafts can be raised more cheaply than standard-budded trees over a 3-year period, the latter are easier to raise, are slightly more frost resistant, and can be interplanted with citrus. Further study is suggested to compare the productive capacity of tip-grafted and standard-budded trees.

4211. HAAS, A. R. C.
Variations in the composition of avocado seed.
Yearb. Calif. Avocado Soc. for 1951, pp. 139-52, bibl. 4.
Avocado seed is used only for the production of seedling rootstocks. This paper emphasizes the changing composition of avocado seed and how as a storage organ certain constituents are translocated from it to other portions of the fruit or tree. The fresh and dry weight and some of the inorganic constituents were determined in the dry matter of the seed of a number of Mexican and Guatemalan varieties. The Ca, Mg and K content of the Mexican varieties averaged much less than those of the Guatemalan varieties. The seeds contain relatively low amounts of Ca and Mg, somewhat higher amounts of P, and high amounts of K. Ca in Fuerte seed from trees on Topa Topa rootstock was greater than in seed from trees on Mexicola rootstock. A study made of seasonal changes in the weight and composition of Fuerte avocado seed from a tree on Mexicola rootstock showed that approximately half of the maximum K content is translocated or removed from the seed during the period of fruit maturation. A similar decrease was observed in the Ca and Mg content of seed. Such losses from the seed may have some bearing on the time of securing seed for rootstock purposes. [From author's summary.] —Citrus Exp. Stat., Riverside, Calif.

4212. SCHROEDER, C. A.
Avocado materials for horticultural research.
Yearb. Calif. Avocado Soc. for 1951, pp. 107-12, bibl. 2, illus.
A brief account is given of avocado species which have been introduced into California for the purpose

of horticultural investigation, with special reference to rootstock and breeding studies. They include *Persea nubigena*, *P. longipes*, *P. indica*, *P. floccosa*, *P. schiedeana*, *P. lingue*, and *P. borbonia*.

4213. Zentmyer, G. A., and Schroeder, C. A.
Research on rootstocks resistant to avocado root rot.
Yearb. Calif. Avocado Soc. for 1951, pp. 157-8.

Seedlings of 9 Mexican, 10 Guatemalan, 2 West Indian and one hybrid varieties were transplanted into infected soil and in addition were inoculated with the fungus *Phytophthora cinnamomi*. During 2 years significant differences were noted in the growth and appearance of the different seedlings; the Guatemalan types were the most vigorous. When, however, the seedlings were dug in 1951, the roots of all 22 varieties were found to be severely attacked by the fungus. Notes are also given on resistance trials conducted with *Persea floccosa*, *P. longipes*, *P. nubigena* and *P. lingue*. *P. indica*, *P. borbonia* and *P. schiedeana* are now also being tested.

4214. Halma, F. F., and White, F. A.
Relative susceptibility of avocado rootstocks to chlorosis. (A progress report.)
Yearb. Calif. Avocado Soc. for 1951, pp. 153-6, illus.

Attention is called to a type of chlorosis observed on young avocado trees in rootstock trial plots. The cause of the disorder has not been determined. The trouble is practically confined to trees worked on Guatemalan rootstocks. Trees on Mexican and West Indian rootstocks seem to be immune or only slightly affected.

4215. Halma, F. F., and Smoyer, K. M.
Cold-hardiness of young avocado trees on Mexican and Guatemalan rootstocks.
Yearb. Calif. Avocado Soc. for 1951, pp. 75-8, bibl. 1.

Although avocado varieties of the Mexican race used as rootstocks are inherently more cold-hardy than varieties of the Guatemalan race, observations made in two young rootstock trial plots indicate that this difference does not manifest itself when the trees are in a succulent condition at the time of a freeze when both are susceptible.

4216. Yarick, B. E.
Care of little trees.
Yearb. Calif. Avocado Soc. for 1951, pp. 79-83, illus.

Methods of irrigation, shading, frost protection, fertilizer application and rodent control are suggested to aid the establishment of newly transplanted avocadoes.

4217. Murphy, J.
Frost protection.
Yearb. Calif. Avocado Soc. for 1951, pp. 87-8, illus.

A further brief account of the use of a wind machine in an avocado orchard. [For an earlier report see *H.A.*, 22: 853.]

4218. Schroeder, C. A.
Flower bud development in the avocado.
Yearb. Calif. Avocado Soc. for 1951, pp. 159-63, bibl. 3, illus.

The conclusions drawn by the author from the study of flower bud initiation in the avocado in California are (1) that floral structures may be evident two months prior to the appearance of flowers, and (2) individual flower buds are formed from six weeks to two months before full bloom in any given variety. Within a given flower the floral envelope or perianth develops first, followed by the stamens, and lastly by the pistil with the single ovule.

4219. Bringhurst, R. S.
Influence of glasshouse conditions on flower behavior of Hass and Anaheim avocados.
Yearb. Calif. Avocado Soc. for 1951, pp. 164-8, bibl. 7.

The first opening of flowers of tip-grafted trees of the Hass and Anaheim varieties in the glasshouse began in early forenoon and the second opening in early afternoon. The situation was reversed with comparable trees and large bearing trees continuously outside. In the latter, first opening flowers appeared initially from noon until late afternoon, apparently fluctuating with the temperature. Night temperatures may be very important, since trees placed in the glasshouse for the night only behaved essentially as the trees under continuous glasshouse conditions, and trees placed in the glasshouse for the day only behaved essentially as trees continuously outside. [Author's summary.]

4220. Lesley, J. W., and Bringhurst, R. S.
Environmental conditions affecting pollination of avocados.
Yearb. Calif. Avocado Soc. for 1951, pp. 169-73, bibl. 4.

Observations made on orchard trees indicate a strong correlation between temperature and flower opening. When the maximum temperature did not exceed 70° F. and the minimum 53° F., Fuerte, a type B avocado variety, either had no fully expanded stage I (female) flowers or they appeared so late in the day that pollination was unlikely. Likewise, type A varieties may have stage I flowers in the morning during a warm period, and in the afternoon or not at all during a cold period. Throughout the latter part of the blossoming season when other conditions are most favourable for fruit setting, climatic conditions at Riverside are such that stage I flowers are relatively infrequent, while at Los Angeles they appear regularly. The definitions of class A and B varieties are probably only valid at certain temperatures. Some additional evidence is given showing that in California bees are important for fruit setting in avocadoes. [From authors' summary.]

4221. Moore, P.
Avocado irrigation.
Yearb. Calif. Avocado Soc. for 1951, pp. 91-6, illus.

Irrigation is the most important operation in avocado production in California. To determine when to irrigate, the soil should be tested with either a soil auger, tube, probe or shovel, depending on soil type. Methods of using these sampling tools are described and the advantages derived from their use are enumerated.

4222. Agricultural Extension Avocado Committee (Smoyer, K. M., and others).
Why prune avocado trees?
Yearb. Calif. Avocado Soc. for 1951, pp. 113-15.
Lack of experimental evidence on pruning avocadoes makes this subject highly controversial and almost every type of pruning can be found in practice. Most observers, however, believe its principal value lies in making other orchard operations easier.

4223. Ayers, A. D., Aldrich, D. G., and Coony, J. J.
Sodium and chloride injury of Fuerte avocado leaves.
Yearb. Calif. Avocado Soc. for 1951, pp. 174-8, bibl. 7, illus.
Tip burn of avocadoes may be caused by an accumulation of chloride within the mature leaf and the severity of the injury is proportional to accumulation. Accumulation of sodium within the leaf causes a different type of burn where injury starts as necrotic spots within or along the leaf perimeter rather than at the tip of the leaf. Soil salinity and levels of exchangeable sodium under affected trees are generally low, but may be slightly higher than such levels under normal trees. [Authors' summary.] [For a shorter account see *H.A.*, 22: 2926.]

4224. Zentmyer, G. A.
Avocado diseases.
Yearb. Calif. Avocado Soc. for 1951, pp. 97-101.
Information is given on the more important diseases of avocado trees in California including root rot (*Phytophthora cinnamomi*), verticillium or avocado wilt, dothiorella rot of fruit (*Botryosphaeria ribis* (*Dothiorella gregaria*)), avocado canker or gummosis caused by *P. cinnamomi* or another related fungus, and girdling canker (*Cylindrocarpon* sp.). Control measures where known are suggested.

4225. Yale, J. W., Jr., and Johnstone, G. R.
The occurrence and effects of *Cephalothecium roseum* on avocado.
Yearb. Calif. Avocado Soc. for 1951, pp. 179-85, bibl. 10, illus.
Cephalothecium roseum occurs as a spoilage organism on avocado fruits and grows as a saprophyte on the stems. The infection occurs through the exposed pedicel scar or through an open wound, and is enhanced by high humidity. A limited survey in southern California indicated that *C. roseum* is distributed generally throughout Fuerte orchards, not occurring at all on stems of other varieties. Light inhibits the growth of the organism. The minimum temperature for growth was found to be about 9° C., the optimum 21-24° C. and the maximum about 36° C. Control measures include careful harvesting of fruit at a time when there is no water on the trees, removal of dead wood and pruning of overcrowded branches.

4226. Bartlett, B., and DeBach, P.
Enemies of avocado pests.
Calif. Agric., 1952, **6**: 5: 14.
In southern California avocado pests are largely controlled by natural enemies. In the few cases where spraying becomes necessary spray materials should be chosen that are least harmful to beneficial insects. Ten materials are listed in order of decreasing hazard to these insects, the list being headed by DDT and DDD. As ants may do as much harm to natural enemies of pests as an insecticide they should be constantly controlled.

Citrus.

(*See also* 3355, 4302a, b, c, f, g, i, j, k, m, n, o, p, r, s, t, u, v, w, 4504, 4525, 4558, 4561.)

4227. Webb, R. G.
The citrus fruit industry in South Africa. A bibliography.
[*Mimeo. Publ.*] *Univ. Cape Town*, 1951, pp. 40, bibl. 184.
In a foreword to this bibliography by one of his students the Director of the School of Librarianship, Cape Town University, points out that it does not claim to be exhaustive. Nevertheless, the 184 references listed, covering literature published since 1910, should include most of the papers of value and should be of assistance to anyone interested in South African work on citrus. The bibliography is divided into sections on citrus fruit in general and on oranges, and these in turn are subdivided by subjects grouped under cultural practices, diseases and pests and their control, and harvesting and storage. Author and subject indexes are provided.

4228. Marloth, R. H.
The scientific development of citriculture in southern Africa.
S. Afr. J. Sci., 1951, **48**: 82-92, reprinted in *Citrus Gr*, 1952, No. 219, pp. 2-9.
Since the first introduction of citrus trees almost 300 years ago, the South African citrus industry has developed into a major factor in the agricultural economy of the Union. The part scientific research has played in this development, particularly during the past twenty years, is reviewed in the light of citrus growing and the problems attendant thereto. [From author's abstract.]

4229. Marloth, R. H.
The citrus industry in South Africa.
Fmg S. Afr., 1952, **27**: 132-4.
The orange was introduced to South Africa from St. Helena in 1654, but citriculture on a commercial scale did not begin until about 1895 and large scale planting only dates from the early 1920's. By 1949 there were nearly 5 million trees, the great majority being oranges. An outline is given of the history of the industry and its present economic importance.

4230. Ross, A. A.
Citrus growing.
Qd agric. J., 1952, **74**: 187-209.
All aspects of citrus growing in Queensland are covered. Common spacings in irrigated orchards are from 25 by 25 to 18 by 18 ft. and sometimes 24 by 18 ft.; wider spacings are used in non-irrigated orchards. The chief varieties are: oranges—Washington Navel, Late Valencia, Joppa; mandarins—Beauty of Glen Retreat, Emperor or Emperor of Canton, Ellendale Beauty, Burgess; lemons—Villa Franca, Lisbon; grapefruit—Marsh; sour oranges—Seville. The chief

rootstocks used are rough lemon and sweet orange. Frost protection is effected by wrapping trunks and branches and by ploughing in surface vegetation in early winter. Fertilizer recommendations are made. Flood irrigation is practicable on heavy soils with a slight slope, but spray irrigation with portable pipe lines and connections at 24 ft. intervals is mostly used. Clean cultivation is the normal practice. A sweating period of 7 days between harvesting and packing is customary to permit satisfactory culling of damaged fruit and shrinkage before packing.

4231. Basson, W. J.
Mid-season orange varieties.
Citrus Gr, 1952, No. 221, pp. 4-5.
Fifteen mid-season orange varieties were selected at Nelspruit in 1947 for further trial in a specially planned variety trial. From the early results the most promising would appear to be Belvedere and Pineapple, followed by Tomango, Letaba Early and Mediterranean Sweet 50. Under some conditions Premier, Shamouti 61, Clanor, Ruby Blood, St. Michaels, Hamlin and Addorosa may succeed, but most of them should be grafted only on orange rootstocks, because on rough lemon their juice solids content would be too low to comply with export regulations.

4232. Cameron, A. E.
Late-held Valencias.
Citrus News, 1951, **27**: 54.
The Valencia strains known as Newton and Lord Howe possess late-holding characteristics not found in ordinary Valencias, but they can only be satisfactorily kept for late marketing if worked on sour orange—not now recommended because of the risk of bud-union decline—sweet orange or trifoliata, and not if grown on citronelle [rough lemon].

4233. Lamour, R.
Le mandarinier: le centenaire algérien. **(The centenary of the mandarin in Algeria.)**
Fruits et Prim., 1951, **21**: 197-200, illus.
The mandarin was introduced into Algeria in 1850. In north Africa it is now grown on 6,000 ha. and this is compared with areas under mandarins in other parts of the world. Its reaction to certain diseases, particularly blind pocket, a form of psorosis, is described. Until more is known about these diseases in relation to the climate of Algeria, growers are advised to select scion wood for grafting from mature, healthy, vigorous and fruitful trees.

4234. Brichet, J.
Les agrumes actuellement cultivés et la nécessité de standardiser notre production par la sélection des greffons. **(The varieties of orange at present grown [in Algeria] and the need to standardize production by the selection of scions.)**
Fruits et Prim., 1952, **22**: 140-2.
Algeria possesses some of the best varieties of orange, but inadequate selection of budwood has filled plantations with degenerate forms. Suitable varieties for each region are named. The establishment of " standardization " stations for the commercial production of carefully selected, standardized scions is recommended.

4235. Ikram-ul-Haq, M.
Botanical description of the citrus rootstocks under trial in the Punjab.
Punjab Fruit J., 1951/1952, **15**: 52: 12-17, bibl. 13.
Detailed botanical descriptions are given of the following varieties: Mokari, a citron; Gada Dehi, a form of *Citrus aurantium*; Jatti Khatti, a rough lemon; Jamberi, a rough lemon; Jullunduri Khatti, a smooth lemon; Khatta, a sour orange; Kharna Khatta, a form of *C. karna*; Mithi, a sweet lemon; Nasnaran, a form of *C. aurantifolia*; and Atoni, a form of *C. rugulosa*.

4236. Bitters, W. P., and Batchelor, L. D.
Citrus rootstock problems.
Calif. Agric., 1952, **6**: 2: 8, 12.
Notes are supplied on citrus tree size, longevity and disease resistance and fruit size and quality as affected by the following rootstocks: sweet orange, sour orange, rough lemon, grapefruit, trifoliate orange, Cleopatra mandarin, Sampson tangelo and Troyer citrange. Recommendations are made on combinations of stocks and scions to be used in future, both on new land and on replanted areas.

4237. Murray, D. B.
Citrus experiments at the St. Augustine Experiment Station, Trinidad, B.W.I.
Trop. Agriculture, Trin., 1951 (issued 1952), **28**: 215-27, bibl. 5.
In a series of experiments established on a deep, sandy loam in 1932 sour orange, sweet Seville, rough lemon and wild grapefruit were compared as rootstocks for Marsh grapefruit and Washington Navel, Valencia and Pineapple oranges. On a basis of yield, fruit quality and resistance to gummosis, sour orange has proved to be the best stock in each case. Of the 3 orange varieties only Valencia has produced fruit suitable for export. Investigations on the effect of height of budding grapefruit and Jaffa oranges onto sour orange stocks, in a range from 2 to 25 in., showed that budding should be done at not less than 15 in. if an increased incidence of gummosis is to be avoided. An experiment on manuring grapefruit grown on 3 stocks showed that with a basic dressing of 150 lb. pen manure and ½ lb. superphosphate per tree per annum yields were increased by the addition of 3 lb. and 4½ lb. ammonium sulphate, but were not increased by K alone or in combination with N. An increase in gummosis was associated with applications of N. The shortcomings of the statistical layouts used are discussed.

4238. Rebour, H.
Le greffage du clémentinier sur triptera. **(Grafting clementines on trifoliate orange stocks.)**
Fruits et Prim., 1951, **21**: 235-6, illus.
At the Boufarik Experimental Station, Algeria, *Citrus triptera* (*Poncirus trifoliata*) rootstocks have shown incompatibility with clementine orange scions when budded at the usual height of about 30 cm. The stock portion of the trunk becomes much enlarged and the disorder known as exocortis is prevalent. The trees may die when about 10 years old. By contrast trees budded low have made healthy growth.

4239. ČHOTUA, E. S.
Scion rooting as a means of restoring lemon trees to health. [Russian.]
Sad i Ogorod, 1952, No. 6, pp. 52-3.

Attempts to grow lemons on the collective farms of Uzbekistan, with young trees on trifoliate rootstocks, have not been successful. The rootstock proved to be unsuitable under these conditions, the trees making poor growth and becoming chlorotic. Some of them, however, showed signs of recovery and it was found that those trees had developed scion roots. It is advised, therefore, that when trees on trifoliate rootstocks are planted they should be placed with the union below soil level, and that trees already planted should be earthed-up to cover the union.

4240. FRITH, H. J.
A factorial field experiment with citrus, Farm 466. No 2: Results 1942-48.
Internal Rep. Irrig. Res. Stat. Griffith **9**, 1949, pp. 10, bibl. 3, [received 1951].

The results are described of the 6-year pretreatment period and the first year's treatments in a citrus factorial field experiment [for layout of experiment see *H.A.*, 22: 2047] at the Irrigation Research Station, Griffith, New South Wales. Rough lemon stock produced more vigorous trees than sweet orange as measured by stem girth, but the difference was not maintained and in 1948 the girths of the same scions on different stocks were the same. The Valencia Lates had a greater girth than the Washington Navels but, owing to different habit, a lesser spread. Judged by volume weight both varieties were of better quality on sweet orange than on rough lemon stocks. From 1942 to 1948 two levels of N were applied: nil and 4 lb. sulphate of ammonia per tree per annum. *1948 treatment results:* The weeds mown treatment caused severe N deficiency which was reflected in smaller girth and spread. The trees on the oil sprayed plots gave an increased yield over the other plots. Oil spray treatment caused a decrease in the infiltration rate of soil. The trees in the light irrigation and alternate-bay-light-irrigation plots had smaller girth and spread than in the other irrigation treatments (heavy irrigation and irrigation with tile drains) which did not differ among themselves. Treatment interactions gave no significant differences.

4241. FRITH, H. J.
A factorial field experiment with citrus, Farm 466. No. 3: Results 1949.
Internal Rep. Irrig. Res. Stat. Griffith **10**, 1950, pp. 18, bibl. 2, [received 1951].

The 1949 results of a citrus factorial field experiment [see *H.A.*, 22: 2047 and above] at the Irrigation Research Station, Griffith, New South Wales, are given in detail. *Cultural treatments*: In September N treatments were changed to nil, 4, 8 and 16 lb. per tree per annum. The effect was rapid and by December there was no difference in colour between trees on the weeds mown plots receiving 8 and 16 lb. and those with the other cultural treatments. The depression in the infiltration rate of the weeds mown plots increased significantly over the remaining 2 cultural treatments (summer clean cultivation and farmyard manure). The weeds mown treatment caused a depression, and oil spraying a significant increase, in size and vigour over the other cultural treatments which did not differ from one another. Oil spray treatment gave the greatest weight of yield followed by clean cultivation, farmyard manure and weeds mown. N caused a significant increase in yield in the weeds mown and clean cultivation treatments, especially the former. The second order interaction, cultural × irrigation × N, reached the 5% level of significance as the result of the weeds mown-light irrigation term. Weeds mown treatment caused a decline in fruit quality, clean cultivation in juice content, and oil spray in sugar content. *Irrigation treatments:* The 2 light treatments caused reduction in tree size and increase in the % total sugars and acids in the fruit and tended to decrease the yield. *Variety:* Trees of both varieties on orange rootstocks had greater trunk girth and spread than those on lemon, and Valencia than Washington Navel on both rootstocks. Navel/lemon gave the highest yield, followed by Navel/orange, Valencia/lemon and Valencia/orange. In interaction between variety and cultural treatment oil spray consistently gave almost as good as or better yield, and weeds mown consistently poorer, than all other treatments. In both varieties the orange rootstock gave the greater weight of fruit.

4242. LOIZIDES, P. A.
The manuring of citrus.
Countryman, Nicosia, 1952, **6**: 1: 4-5.

In a trial at Fassouri, Cyprus, over 3 years, sulphate of ammonia (N) plus superphosphate (P) applied in February did not affect yields of oranges and grapefruit the first year, but gave substantial increases in the two following years. Neither N nor P alone gave appreciable yield increases, but P improved quality, whereas excess N and particularly excess K produced fruit with thick rinds and rough skins.

4243. HAAS, A. R. C.
Molybdenum deficiency symptoms in leaves of orange cultures.
Calif. Citrogr., 1952, **37**: 278, 288, bibl. 2, illus.

The leaves of rooted Valencia orange cuttings grown in solution cultures for several years at pH values of 4·5 or 6·0 without Mo developed yellow spot symptoms as described from Florida. Although the pH was controlled daily by means of calcium hydroxide, affected leaves were very low in Ca, rather low in Mg and very high in K.

4244. BOUHELIER, —., AND OTHERS.
Compte-rendu des résultats d'un essai de mise à fruits de clémentiniers par taille et incisions. (Années 1948 et 1949.) **(Results of an experiment to make clementine oranges fruit by pruning and ringing, 1948 and 1949.)**
Compte-rendu d'un essai comparatif des résultats obtenus par incisions annulaires du clémentinier pratiquées à différentes périodes de la floraison (première année). **(Comparative results of ringing clementine oranges at different flowering stages. (First year.))**

Résumé des resultats des essais indicatifs de mise à fruits de clémentinier dans différentes régions de Maroc. **(Summary of results of experiments designed to make clementine oranges fruit in different parts of Morocco.)**
Terre maroc., 1952, **26**: 183-8, 228-33, 261-6, illus.

1. Experiments at Benu Amar begun in 1948 [see *H.A.*, 20: 1914] were continued in 1949. The treatments and the relationship of their average annual yields per tree per annum for the years 1948 and 1949 to that of the controls were: (1) 2 ringings per annum with no pruning—63% more than controls; (2) 2 ringings per annum and pruning 1948—49% more; (3) 1 ringing per annum and pruning in 1948—8% less. The control yield was 4 times greater than the average yield per tree per annum for the whole plantation in the 3 years before the experiment. Results are also given for the average weight of individual fruits; average number of pips per fruit (over 2 in controls and less than 1 in treated trees); and earliness, the controls being earliest in the upper and very much the latest in the lower part of the area.
2. Considerable yield increase was normally obtained in double ringing experiments but in some cases it was small, apparently due in part to an unfavourable ringing date. In a replicated experiment on Fischers at Mechra Ben Abbou in 1951 higher yields were obtained when the first ringing (followed 3-4 weeks later, when it began to heal, by the second) was done in the later stages of flowering, viz. (1) beginning of flowering—34 kg. per tree; (2) buds full grown but not open—32 kg.; (3) flowers open—54 kg.; (4) at petal fall—77 kg. These yields were from 14 to 33 times greater than those of the controls (2·3 kg.). Ringed trees were earlier than the controls and gave a larger proportion of small fruits.
3. The general conclusion is drawn that 2 successive ringings of the main branches is a suitable method of making the clementine orange fruit.

4245. Rebour, H.
Les grosses oranges. Comment réduire leur calibre. **(How to reduce the size of large oranges.)**
Fruits et Prim., 1952, **22**: 45-6.

Washington and Thompson navels grown in French North Africa are almost unsaleable abroad owing to their large size. To reduce their size by ensuring increased numbers of fruits per tree an application of N fertilizer at least a month before flowering is recommended.

4246. Blondel, L.
L'évolution du grossissement des fruits (agrumes) à la Station Expérimentale d'Arboriculture de Boufarik (Alger). **(The increase in the size of citrus fruits at the Boufarik Experiment Station for Arboriculture, Algeria.)**
Fruits et Prim., 1951, **21**: 405-6.

Figures obtained on the growth of fruits of 5 varieties of citrus during 1947 and 1948 are expressed in graphs. They show that the fruits continue to grow until the end of November or beginning of December. This increase in size continues as long as the soil moisture is favourable. In general irrigations should be continued until autumn, and their application is likely to increase the weight of the crop.

4247. Rebour, H.
Chute de juin et fumure azotée. **(June drop and nitrogen fertilizing.)**
Fruits et Prim., 1951, **21**: 278-9.

A marked June drop was observed in 1951 in Algerian orange groves. Nitrogen fertilizers have been generally used to counteract the June drop but this was not effective in this year owing to the very dry weather in April. It is therefore advised that, in addition to applying fertilizers, irrigation should be practised in dry periods in spring.

4248. Crescimano, F. A.
Effetti di trattamenti ormonali sulla cascola del mandarino. **(The effect of hormone treatment on fruit drop in mandarins.)**
Riv. Ortoflorofruttic. ital., 1951, **35**: 270-2, illus.

Two years' experiments in Sicily showed that treatment with an α-naphthaleneacetic product, Planofix, reduces the drop of mature mandarin fruits.

4249. Blondel, L.
Lutte contre la chute prématurée des oranges " Portugaise " à l'aide de phytohormones. **(Controlling pre-harvest drop of Portugal oranges by using plant hormones.)**
Fruits et Prim., 1951, **21**: 367-9.

Of three plant hormones used in the experiments recorded, the best results (44% drop as against 74% in controls) were obtained with 2, 4-D at 1/100,000, applied early in January, the crop being picked two months later.

4250. Davison, R. M., and Cederman, J. A.
Control of pre-harvest drop of sweet oranges by hormone sprays.
Orchard. N.Z., 1952, **25**: 2: 4-5, 7.

Results obtained over the past three seasons showed that a 15 to 20 p.p.m. spray of 2,4-D reduces considerably the normal winter drop of Washington Navel oranges and effects an economic saving of sound fruit. It was also found that the 20 p.p.m. spray caused marked leaf and shoot distortion on both passionfruit and tree-tomato plants, but the injury was only temporary and the plants outgrew it after producing five or six distorted leaves. As these two fruits are often grown near citrus blocks, care should be taken to reduce drift while applying hormone sprays.—D.S.I.R., Auckland.

4251. Nankivell, W. I.
Winter drop of grapefruit.
J. Dep. Agric. Vict., 1952, **50**: 170-1, illus.

To control pre-harvest drop of grapefruit, which is sometimes very heavy, growers are recommended to spray the trees in May [in Victoria], after the autumn growth has ceased, with a solution containing 22 p.p.m. of the sodium salt of 2,4-D, one pint of white oil to 100 gal. of spray being added as a spreader and sticker.

4252. Brooks, F. A., and others.
Heat transfers in citrus orchards using wind machines for frost protection.
Agric. Engng St. Joseph, Mich., 1952, **33**: 74-8, 143-7, 154, bibl. 28, illus.

An analytical study of heat transfer and interpretations of typical frost control problems are described. Results

of experiments conducted in Californian citrus orchards to study frost protection by means of smoke, heating and fans are given. Frost control by fans has many advantages, including low operating costs, but in some cases wind machines may have to be used in conjunction with orchard heaters to provide protection over relatively large areas. [For a shorter account see *H.A.*, 22: 1799.]

4253. Angus, D. E.
Trials of inclined axis fan in the protection of citrus orchards from frost. Part 2.*
Sect. Rep. C.S.I.R.O. Sect. met. Phys. **2**, 1952, pp. 34, bibl. 6, illus.

The distribution of temperature rise in the orchard due to the fan was investigated for differing temperature inversions, different angles of tilt of the blades to the horizontal, and different speeds of rotation of the fan head. A progressive increase was found in the areas of 1° F., 2° F. and 3° F. temperature rise with increased tilt of the blades up to 62° from the horizontal. At this tilt an improvement in area of 2·6 times that with the blades horizontal was obtained with a consequent efficiency of about 3½ H.P. per acre for a 2° F. rise. A progressive increase in area was also found with increasing temperature inversion, but for very large inversions the area began to decrease. Further work is necessary to decide on the optimum speed of rotation of the fan head. [From author's summary.]

4254. Wyss-Dunant, E.
Mutation ou dégénérescence des Washington Navel? **(Mutation or degeneration of Washington Navel.)**
Fruits et Prim., 1951, **21**: 392-3, illus.

Observations are recorded on a disorder of the Washington Navel orange which causes the whole crop of affected trees to be unusable. In affected trees, which may be 8 to 25 years old, the terminal branches soon lose their normal posture and instead of being almost horizontal become erect and compact; the young leaves are more circular than usual and the foliage generally becomes variegated. The fruit is deformed, loses its flavour, and is unsaleable. The disorder is not associated with deficiencies in the soil or with improper cultivation, and at present its cause is unknown. Meanwhile growers are advised to remove all affected trees.

4255. Pasinetti, L.
Studio sulla " corosi variegata " in *Citrus deliciosa*. **(A study on spotted chlorosis in *Citrus deliciosa*).**
Ann. Fac. Sci. Agrar. Univ. Palermo, 1950, **1**: 13-51, from abstr. in *Fruits d'Outre Mer*, 1952, 7, Suppl. p. 46.

The chlorosis is found throughout the leafy period. It is due to demineralization of the tissues at the base of the trunk, their vessels becoming obstructed with gummy and mineral deposits. The intermittent absorption of mineral elements causes the spotted character of the chlorosis.

4256. Posnette, A. F.
Virus decline disease of citrus.
World Crops, 1952, **4**: 64-6, bibl. 10, illus.

Recent research on virus diseases of citrus in various parts of the world is reviewed. It is concluded that, though some gaps remain to be filled, the results of independent investigations fit together to produce a composite but essentially simple picture. The history of these diseases emphasizes the danger of transferring viruses from one country to another in symptomless plant material.

4257. Bitters, W. P., and Parker, E. R.
Quick decline studies.
Calif. Agric., 1952, **6**: 3: 7, 15, illus., and **6**: 4: 10-11, 16, illus.
Wallace, J. M., and Bitters, W. P.
Top-root relationships in the quick decline disease of citrus.
Calif. Citrogr., 1952, **37**: 269, 271.

The first of these papers is the more detailed. A trial including 14 different rootstocks was started in 1945 and another with Valencia orange on 125 rootstocks in 1948. Half the trees were inoculated with buds from diseased trees. The results suggest that there is some effect of inoculation on any combination; even where no symptoms of quick decline developed reduced growth was evident. It is not yet known whether this effect is temporary or permanent. Tentative conclusions reached as to the tolerance of Valencia trees on various stocks are: (1) trees on shaddock hybrids and lemon hybrids are more susceptible than trees budded on sour orange; (2) trees on shaddocks and most lemons are equally as susceptible as those on sour orange; (3) trees on tangelos and grapefruit are non-tolerant but have not shown such severe decline as those on sour orange; (4) trees on sweet orange, trifoliate orange, some trifoliate orange hybrids and mandarins are slightly stunted by inoculation, and (5) the smallest effects occurred in trees on rough lemon, Rangpur lime, Kusaie lime and *Citrus moi*. Lemons used as scions have so far remained free of the disease regardless of the stock, but some inoculated grapefruit on sour orange roots have shown symptoms of quick decline after 3 years. It is apparent that varieties within a species when used as stocks vary in response to inoculation with the virus depending on the variety used as scion. Inarching affected trees with a resistant root has resulted in too slight an improvement to justify the expense. Bridgegrafting has proved ineffective. Mildly affected trees can be satisfactorily top worked only to lemons, but the first trees treated in this way are only in their sixth year and in any case the method has only a limited practical application. The control of insect vectors offers little hope of effective control, but with the present rather slow spread of the disease into hitherto clean orchards it may be worth removing diseased trees as soon as they appear.

4258. Bitancourt, A. A.
Estudos sôbre a " tristeza " dos citrus. II. Susceptibilidade das diversas combinações de enxertia de laranjeira doce e laranjeira azêda. **(Studies on tristeza disease of citrus. II. Susceptibility of the different stock-scion combinations of sweet and sour orange.)** [English abstract 1 p.]
Arq. Inst. biol. S. Paulo, 1950/51, **20**: 39-52, bibl. 7, illus.

* For Part I see *H.A.*, 22: 884. It should be noted that certain errors of measurement were made in these two reports, and that corrigenda have been issued.

In 1943/44 approach grafts of sweet and sour orange were made to obtain the following combinations: (1) sweet on sweet, (2) sour on sour, (3) approach graft of sweet and sour, (4) sweet on sour, (5) sour on sweet, (6) crown of sweet and sour on sweet orange roots, (7) crown of sweet and sour on sour orange roots, (8) sour on roots of sweet and sour, (9) sweet on roots of sweet and sour, (10) intermediate of sour between crown and roots of sweet, (11) intermediate of sweet between crown and roots of sour. Incidence of tristeza symptoms was recorded in 1947. Symptoms were severe in all trees of group 4, and present but less severe in groups 7 and 9. In all three groups the trunk and roots of sour orange were much less developed than in the controls (group 2) or than in groups showing no symptoms. In group 10 the leaves had a normal dark green colour but the crowns were small and poorly developed. The sour orange intermediate was markedly restricted compared with the sweet orange rootstock and crown. No symptoms of tristeza were observed in the other groups. These results indicate that symptoms of tristeza will only develop when there is a crown of sweet orange on a stock or intermediate of sour orange. Apparently the virus will multiply only if there is enough foliage of sweet orange above sour orange tissues, but is lethal only to the sour orange. The results obtained in group 10 show that the collapse of phloem in the sour orange bark does not completely prevent the translocation of carbohydrates from the sweet orange crown to the sweet orange stock below the intermediate. Translocation possibly occurs through the cell walls rather than through the phloem vessels. It is concluded that the effect of the virus is to alter the metabolism of carbohydrates in the sour orange bark, preventing the synthesis of cellulose and starch in its cells.

4259. COSTA, A. S., GRANT, T. J., AND MOREIRA, S.
Bud-take of healthy and tristeza-infected citrus buds.
Phytopathology, 1952, **42**: 280-1.

In tests made at Campinas, Brazil, for comparing the growth of sprouts from healthy and tristeza-infected buds on different citrus rootstocks, both types of bud usually took very well, but in some experiments in which budding was performed under unfavourable conditions, buds from plants of certain citrus varieties showing early stages of decline gave a better take than healthy ones. The results obtained on 7 rootstock varieties are tabulated. The better bud-take obtained with virus-carrying buds, even when budding was made on the non-tolerant sour orange rootstock, indicates that tristeza virus had no detrimental effect on the development of callus tissue at the bud union.

4260. STUBBS, L. L.
Virus diseases of citrus in Victoria. 1. A virus disease of mandarin on rough lemon (*Citrus limon* (Linn) Burmann) rootstock.
J. Dep. Agric. Vict., 1952, **50**: 124-8, bibl. 9, illus.

A graft-transmitted disease of Ellendale mandarin believed to be caused by a virus which causes a slow decline of trees on rough lemon rootstock is described. At present there is insufficient evidence to distinguish between the mandarin disease and the " bud-union decline " disease. Sweet orange scions do not decline on rough lemon stock in Victoria but this stock gives unsatisfactory results with some citrus species, including Early Imperial mandarin and the Maltese Blood orange. Sour orange seedlings on their own roots become severely dwarfed and chlorotic when graft inoculated from Ellendale mandarin trees on rough lemon and sweet orange rootstocks. Inarching and patch grafting small citrus seedlings were used in the virus transmission studies described.

4261. FRASER, L.
Seedling yellows, an unreported virus disease of citrus.
Agric. Gaz. N.S.W., 1952, **63**: 125-31, bibl. 8, illus.

A previously undescribed virus causes severe yellowing and stunting of seedling Eureka lemons, Seville oranges, grapefruit and citrons, and less severe yellowing of Ellendale mandarin and some other varieties. The virus appears to be general in sweet orange and mandarin trees in coastal New South Wales and is present in about 75% of sweet orange in inland areas. It is suggested that it may be the cause of shellbark disease of lemons and Seville oranges, and of decline disease of Ellendale mandarins on rough lemon stock. The virus is transmitted by *Aphis citricidus*.

4262. CHILDS, J. F. L.
Cachexia disease, its bud transmission and relation to xyloporosis and to tristeza.
Phytopathology, 1952, **42**: 265-8, bibl. 14, illus.

Cachexia can be transmitted by buds taken from diseased citrus trees; this shows that the causal agent is widely distributed in the tissues of affected trees, although the damage to conducting tissues seems to be mostly confined to the region of the bud union. Seedling Orlando tangelo trees were infected by means of bud-wood, while neighbouring unbudded Orlando seedlings and those budded with healthy buds remained healthy, thus indicating no natural spread from tree to tree. Rootstock experiments showed that gum impregnation and discoloration of the phloem characteristic of cachexia may occur in mandarins, kumquats, and hybrids of either of these. Evidence was obtained that grapefruit and sweet orange may become carriers of the causal agent. The use of healthy bud-wood appears to be important in controlling the disease. Observations indicate that cachexia and xyloporosis are the same disease, but that tristeza is distinct.

4263. COSTA, A. S., AND OTHERS.
Superbrotamento ou envassouramento da laranjeira. **(A form of witches' broom on orange trees.)** (English summary 8 lines.]
Bragantia, 1950, **10**: 149-50, bibl. 1, illus. [received 1952].

A type of witches' broom was observed in 1949 on some orange trees in a nursery at Araras, S. Paulo, Brazil, while in a 5-year-old citrus grove at Limeira, S. Paulo, the symptoms were shown by about 30% of the trees of the orange variety Pera grafted on Caipira stock. The yield of affected trees was greatly reduced. There are indications that the occurrence of the disorder is associated with the use of budwood from affected trees. Transmission tests are being carried out to determine whether this type of witches' broom is of genetic or virus origin.

4264. Rossetti, V., and Bitancourt, A. A.
Estudos sôbre a " gomose de phytophthora " dos citrus. II.—Influencia do estado de vegetação do hospedeiro nas lesões experimentais. **(Studies on *Phytophthora* gummosis of citrus. II. The effect of state of vegetation of the host on the size of experimental lesions.)** [English abstract 2½ pp.]
Arq. Inst. biol. S. Paulo, 1950/51, **20**: 73-94, bibl. 4, illus.

The following series of 4 experiments was carried out on sweet orange trees to determine the influence of vegetative activity on susceptibility to *Phytophthora citrophthora*. (1) Two-year-old seedlings, divided according to the stage of development of the new flush of growth, were inoculated with the fungus. After 15 days the lesions were larger on the trees with very young growth than on trees with well developed shoots or with no flush of growth. (2) Five-year-old seedlings of susceptible, intermediate and resistant varieties were pruned so as to be completely deprived of their green parts. Trees of each variety were inoculated 23, 30, 40 and 79 days after pruning. In general there was a marked increase in the size of the lesions as the shoots developed. In the third group, however, the lesions were smaller than in the second, probably as a result of lower rainfall. (3) In order to avoid differences in weather conditions during the development of the lesions, susceptible, intermediate and resistant varieties were pruned as above but on 4 different dates. The trees were then all inoculated at the same time. Whereas no effect of the stage of development of the shoot was observed in the case of the resistant variety Pera and the intermediate Lisa Paulista, in the case of the intermediate Hamlin and the susceptible Abacaxi the size of the lesions increased with the size of the new shoots. These last 2 experiments show that, in the case of susceptible varieties, lesions are largest when the crown of the tree is fully restored. This is ascribed to the increased physiological activity of the bark as a result of increased leaf surface. (4) Half of each tree was deprived of all its leaves, and the trees were inoculated on both the pruned and unpruned sides. Lesions on the unpruned sides were considerably larger than those on the pruned sides. Thus in the first experiment the lesions were greatest in the group with the youngest shoots, while in the 3 pruning experiments lesions were smallest at that stage. The difference is thought to be due to the difference in the condition of the trees. Two factors therefore influenced the size of the lesions; the most important being the leaf surface and the other being the presence of newly developed shoots. The increased physiological activity prevailing during the stage of early development of the shoot renders the trees more susceptible to attack.

4265. Wager, V. A.
The scab disease of citrus.
Emg S. Afr., 1952, **27**: 281, 288, illus.

Scab caused by *Sphaceloma fawcetti* is common on lemons but has only rarely been reported on oranges in South Africa. In recent years it has caused heavy losses in a large grapefruit planting in Zululand, among fruits situated on the south side of the trees. Excellent control was obtained by spraying twice at a 10-day interval just after petal fall with 2–1–80 bordeaux mixture. Except where heavy rain occurs one spraying should generally be sufficient.

4266. Petrušova, N. I., and Kudrjašova, L. S.
The control of black leg in citrus seedlings. [Russian.]
Sad i Ogorod, 1952, No. 4, pp. 23-4, illus.

Citrus seedlings in the Crimea become affected in the seed beds with a " black leg " disease caused by species of *Rhizoctonia*, *Pythium*, and *Fusarium*. The symptoms are a constriction of the stem at ground level, with a softening and browning of the tissues. The affected seedlings wilt, often collapse, and then wither. In trials for disinfecting the soil, good control was given by 0·5% formalin.

4267. Foote, F. J.
Soil fumigation for citrus replanting.
Calif. Citrogr., 1952, **37**: 276, 286-8.

Lisbon lemon trees on sweet orange stock were planted on 5 plots in a commercial property in 1947 on fumigated and non-fumigated soil. Early growth and yields were much increased and fruit quality improved in the fumigated rows. Costs and returns are tabulated which show that up to February 1952 fumigation had shown a profit over costs in 4 out of the 5 plots. As regards fumigants experience suggests that under favourable conditions carbon bisulphide is as effective as D-D if used at about twice the rate of application. The initial tree response from ethylene dibromide is less, but its cost is lower. Suggested rates of application for the 3 fumigants are tabulated for sandy, loam and clay soils.

4268. Gerhardt, P. D.
Ant control in citrus groves.
Calif. Agric., 1952, **6**: 5: 13, illus.

A thorough spring spray application of 2 lb. actual chlordane in 100 gal. water to the trunks of, and ground beneath, citrus trees has controlled ants, particularly Argentine ants, for about 6 months. Parathion and toxaphene were less effective. Aldrin and dieldrin need further testing.

4269. Di Martino, E.
Ancora una prova di lotta contro la mosca delle frutta. **(Another experiment on the control of the [Mediterranean] fruit fly.)** [English summary 15 lines.]
Ann. Sper. agrar., 1952, **6**: 5-14, bibl. 5.

An experiment on the control of *Ceratitis capitata*, the Mediterranean fruit fly, was made in an orange grove at the Acireale Plant Diseases Observatory in Sicily in 1950. Foliage and fruit were sprayed with 0·25% and 0·5% Gesarol 50, a wettable DDT, when the attack began and the treatment was repeated twice at intervals of 20 days. In the control 58% of the crop was damaged, as compared with 5·24% and 7·39% in the plots treated with 0·5% and 0·25% DDT respectively.

4270. Jeppson, L. R.
Climate and citrus mites.
Calif. Citrogr., 1952, **37**: 277, 298-9.

The distribution and control of 5 mites attacking citrus are discussed with reference to climatic factors.

4271. Jeppson, L. R.
Field studies with new acaricides to control citrus bud mite.
J. econ. Ent., 1952, **45**: 271-3, bibl. 2, being *Pap. Calif. Citrus Exp. Stat.* **709**.

In preliminary field screening tests with 44 different spray materials, only 5 resulted in effective control of the citrus bud mite: namely, the dicyclohexylamine salt of 4,6-dinitro-*ortho*-secondary-butyl phenol (aramite), di-2-ethylhexyl phthalate, DDT, chlordane, and 2-(*p-tert.*-butylphenoxy) isopropyl-2-chloroethyl sulfite. For reasons indicated, aramite appears to be the only one of the materials that may be used effectively in California for control of citrus bud mite. [Author's summary.]

4272. Di Martino, E.
Anomalie di sviluppo su piante di *Citrus* determinate da un eriofide. **(Abnormal development in citrus caused by an eriophid)**
[English summary 6 lines.]
Ann. Sper. agrar., 1952, **6**: 241-8, bibl. 4, illus.

The occurrence in Sicily is reported of an unidentified mite which is parasitic on the buds of citrus, especially lemon. It causes abnormal development of the fruits, flowers, leaves and shoots.

4273. Fleschner, C. A.
Dustywings on citrus in California.
Calif. Citrogr., 1952, **37**: 296, 298.

Four genera belonging to the Coniopterygidae are predators of citrus mites and the younger stages of scale insects. In order of decreasing importance they are *Parasemidalis*, *Conwentzia*, *Coniopteryx* and *Malacomyza*. Field trials have shown that when certain new acaricides such as Ovotran and Aramite, that are not insecticides, are used against mites the period of effective control is prolonged by the action of these dustywings. They are, however, very sensitive to DDT, which helps to explain increases in mite population following the use of this material.

4274. Atkins, E. L., Jr.
Control of fruit tree leaf roller on citrus.
Calif. Citrogr., 1952, **37**: 233, 254, bibl. 4, illus.
Fruit tree leaf roller.
Calif. Agric., 1952, **6**: 6: 5, 15, illus.

Methods of determining the need for treatment against the fruit tree leaf roller, *Archips argyrospila*, and of timing insecticide treatments in relation to egg hatch are described. Four insecticides, DDT, DDD (TDE), parathion, and EPN, have consistently given adequate control on citrus and formulae are given for both sprays and dusts of each, as well as suitable combinations with other insecticides or with minor elements. Among new materials under trial, one, Q-137, which is similar to DDD, has given promising results.

4275. Entomological Branch, Department of Agriculture, N.S.W.
Two citrus orchard butterflies (Papilionidae).
Agric. Gaz. N.S.W., 1952, **63**: 190-2, illus.

In New South Wales the larvae of the large citrus butterfly (*Papilio aegeus*) and the small citrus butterfly (*P. anactus*), two native species, cause damage to the younger foliage of citrus trees in most seasons and are often found in numbers in home gardens. Their life cycle is outlined. Young or cut-back trees, with tender growth, are particularly liable to injury. For their control a DDT spray at 0·05% is suggested. On small areas handpicking of the caterpillars may be sufficient.

4276. DeBach, P.
Biological control of red scale in San Diego County.
Calif. Citrogr., 1952, **37**: 136-7, 158.
California red scale.
Calif. Agric., 1952, **6**: 3: 8, 12.

Studies in parts of San Diego County have shown that parasites, notably the golden chalcid *Aphytis chrysomphali* with *Comperiella bifasciata* playing an important subsidiary role, have satisfactorily controlled *Aonidiella aurantii* in unsprayed groves, provided that ants were also controlled. Conditions favouring biological control in these areas are a mild, equable climate, a scarcity of other pests that would necessitate spraying and relative freedom from air-borne dust. Elsewhere in California conditions are less favourable.

4277. Perret, J.
Essais de différents traitements sur la " cochenille-virgule " (*Lepidosaphes beckii* Newm.). **(Trials with different treatments against the purple citrus scale.)**
Terre maroc., 1952, **26**: 224-7.

Six insecticidal treatments were applied to citrus near Rabat in early March when flowering was beginning. Those not including white oil (DDT; diethyl thiophosphate and paranitrophenyl) gave poor results. The efficacy of 4 white oil treatments was: 1·66% white oil as an emulsion with 0·25% DDT containing 20% active substance—82·9%; white oil as above plus 0·02% diethyl thiophosphate and paranitrophenyl as a 4% solution—80·4%; white oil—76·9%; white oil and DDT as above plus 2% of a powder containing 5% rotenone—76·7%. Repeated on 1 August the white oil plus DDT treatment gave better results than white oil alone. At least 2 white soil insecticide treatments per annum are considered necessary to control a heavy infestation.

4278. Johnston, C. J. R.
Tent-puller.
Citrus News, 1952, **28**: 26, illus.

A power operated device, mounted on its own chassis, for drawing fumigation tents over citrus trees has been designed by a Victorian grower. It can erect tents at the rate of 1 a minute with the minimum of effort.

4279. Wedding, R. T., Riehl, L. A., and Rhoads, W. A.
Effect of petroleum oil spray on photosynthesis and respiration in citrus leaves.
Plant Physiol., 1952, **27**: 269-78, bibl. 16, being *Pap. Calif. Citrus Exp. Stat.* **707**.

In experiments to study the effect of petroleum oil insecticides on photosynthesis and respiration in citrus leaves, young plants of Washington Navel orange and Eureka lemon were sprayed once with an emulsion containing 2% of a California medium-grade emulsion type spray oil and kept under observation for 59 days. The treatment reduced the rate of photosynthesis in the leaves of both species and also caused a corresponding

but smaller decrease in respiration. The data suggest that at least part of the decrease in the percentage of soluble solids in the juice of citrus fruits which accompanies oil-spray applications may be due to inhibition of photosynthesis.

4280. Pennisi, L.
Indagine analitica sulla penetrazione del DDT nelle arance. **(Analytical study of the penetration of DDT into oranges.)** [English summary 9 lines.]
Ann. Sper. agrar., 1952, **6**: 15-22, bibl. 9.

A study was made at the Acireale Fruit and Citrus Research Station, Sicily, in 1950, on the penetration into oranges of Gesarol 50, a wettable DDT, when applied several times at spray concentrations of 0·25% and 0·5%. DDT was not found in the pulp, but residues on the skins were 1·15–2·5 p.p.m. and 4·67 p.p.m. at the two concentrations respectively, and penetration into the rind was 1·22–1·77 p.p.m. and 3·2–3·3 p.p.m. respectively.

4281. Anon.
New lemon clipper developed.
Calif. Citrogr., 1952, **37**: 260, illus.
De Garmo, E. P., Smith, R. J., and Davis, L. E.
New type lemon clipper.
Calif. Agric., 1952, **6**: 6: 7, illus.

The new experimental clipper has curved jaws conforming to the shape of the fruit and a bevel under the blade edges to prevent it from cutting the skin. It avoids the need for double clipping. The second and more detailed account describes field tests in which the use of the new clipper increased the fruit picking rate by 30% and reduced the proportion of fruit rejected through injury.

4282. Cassin, J.
Expériences sur l'action fongicide de différents produits pour la lutte contre la moisissure des agrumes. **(Experiments on the fungicidal action of different materials for the control of blue and green moulds of citrus.)**
Fruits et Prim., 1952, **22**: 18-20.

Penicillium italicum and *P. digitatum* cause serious losses in packed citrus in Algeria. The varieties with soft skins are most susceptible to injuries during picking and handling and therefore to moulds, the variety Portugal being the least resistant. In trials at Boufarik fruits were immersed in one of a number of solutions for varying periods, or were wrapped in paper impregnated with diphenyl. The wrapping proved to be the most effective treatment, rotting being reduced to 25-30% of that in control samples.

4283. Pupillo, M.
Un marciume dei frutti di limone prodotto da una associazione di micromiceti. **(An instance of rot in lemons caused by a complex of fungi.)** [English summary ½ p.]
Ann. Sper. agrar., 1952, **6**: 53-67, bibl. 18, illus.

A case of rot in lemon fruits grown at Bologna was found to be due to a complex of the micromycetes, *Gloeosporium pedemontanum*, *Septoria limonum* and *Peyronellaea prunicola*.

4284. Perret, J.-E., and Lespes, L.
Essai sur l'effet désinsectisant du conditionnement moderne des agrumes. **(Trial on the removal of scale insects from citrus in the packing house.)**
Terre maroc., 1952, **26**: 179-82.

Treatment by cold and hot water brushing removed an average of 54% of the live and dead scales from 3 samples, being more effective against the dead scales (65% average reduction as compared with 35%).

4285. Smith, R. J.
A time and motion study in packing lemons.
Calif. Citrogr., 1952, **37**: 275, 292-5, illus.

In the packing house layout described the packer faces the supply of fruit which is brought close to hand by tilting the feed belt. A high stool is provided to enable the packer to alternate between standing and a semi-sitting attitude which reduces fatigue. The box is between the packer and feed belt and the fruit can be transferred to it using both hands and without bending or twisting. Used for the new half-box carton, in which topping and therefore sizing are eliminated, it has been shown that unwrapped lemons can be packed at least 3 times as fast as by conventional methods. Even faster packing would appear to be possible with the so-called hand-count push system in which the fruit is merely counted into the carton and pushed down firmly without arranging it in a pattern.

4286. Anon.
Exportation des agrumes d'Algérie en containers. (Campagne 1950-51.) **(The export of citrus from Algeria in bulk containers. (1950-51 season.))**
Le container et l'exportation des agrumes d'Algérie. **(Bulk containers and the export of citrus from Algeria.)**
Fruits et Prim., 1952, **22**: 63-6, 96-9.

The first paper describes tests of large wooden containers of 7-9 cu.m. weighing 4-5 tons when full as a means of avoiding the heavy cost of handling smaller cases. Their advantages were: (1) the fruit travelled perfectly whether packed loose or in boxes provided aeration was sufficient; (2) heavy, costly packaging was obviated; (3) loading and unloading were easy and quick provided suitable cranes were available; (4) damage and theft were avoided. The second article states that packing, handling and freight charges per net kg. were 13% lower to Marseilles and 4% lower to Paris than for fruit packed in standard cases.

4287. Erickson, L. C.
Growth regulators and lemon storage.
Calif. Citrogr., 1952, **37**: 321.

The addition of 2,4-D or 2,4,5-T to the water-wax emulsion used in packing houses has been shown to improve the storage life of lemons by reducing the number of black buttons and the amount of decay, and by delaying ageing. Where a growth regulator spray had previously been applied in the orchard still better control of black buttons resulted. Quantities to be used of several commercial formulations of 2,4-D and 2,4,5-T are listed, and certain precautions to be taken are indicated.

4288. TINDALE, G. B.
Storage experiments.
Citrus News, 1950, **26**: 134-5, 137.

In trials in 1949-50 navel oranges from trees on citronelle (rough lemon) stock stored for 1 and 2 months at 45° F. showed more wastage from penicillium moulds than fruits from trees on sweet, sour or trifoliate orange stocks; after 3 months wastage was very high in all cases. Valencia oranges from trees on trifoliate stock, similarly treated, showed less wastage after 2 and 3 months than fruits from trees on the other 3 rootstocks. With both varieties fruits dipped in wax +4% borax+2% boracic acid generally showed less wastage than untreated fruits wrapped in waterproof polyethylene. In a small trial with navels wastage was considerably reduced when ozone gas was liberated in the storage chamber, but with Valencias this treatment showed no advantage over the controls. During storage the ascorbic acid content of Valencia fruits from trees on citronelle stock decreased much more than in fruits from trees on the other stocks.

4289. B., E.
The production of lime oil.
Colon. Plant Anim. Prod., 1951, **2**: 212-15, bibl. 3.

The main sources of lime oil are Mexico and the British West Indies where the West Indian lime is used, and Florida where increasing quantities of the Tahitian (Persian or seedless) lime are used. Export figures for the former are tabulated for the 5 years 1946-50. It is doubtful whether oil from the Tahiti lime will be readily saleable once the supply of oil from West Indian limes equals demand. Methods of extraction, by distillation and by expression including the recent method of cold expression, are discussed.

Macadamia nuts.

4290. MILLER, W. W.
The macadamia or Queensland nut.
Yearb. Calif. Avocado Soc. for 1951, pp. 128-33, bibl. 4, illus.

Notes are given on macadamia nut growing in Australia, Hawaii and in the United States, particularly California, where there is a growing interest in macadamia as a potential new crop. There are two distinct types of this nut in Hawaii and in the U.S.; the rough shell type, *Macadamia ternifolia* and the smooth shell type, *M. t.* var. *integrifolia*. *M. ternifolia* has slender upright growth and a deep root system, and bears annual crops of very good quality when eaten raw. *M. t.* var. *integrifolia* has more spreading growth and a shallower root system, is everbearing and its nuts are best roasted. In general, macadamias appear to do well under the type of care, soil, water and climate suitable for avocadoes. Where ants are controlled (with chlordane or lindane) insect pests are no problem and the trees have shown resistance or immunity to root rot.

4291. HAMILTON, R. A., STOREY, W. B., AND FUKUNAGA, E. T.
Two new macadamia nut varieties and an appraisal of the H.A.E.S. named varieties.
Circ. Hawaii agric. Exp. Stat. **36**, 1952, pp. 5, bibl. 1, illus.

Brief descriptions are given of Wailua, formerly known as 36–475, 475 or No. 44, and of Ikaiki, formerly known as 36–333 or 333. The former comes into bearing earlier than other named varieties, and the latter is the hardiest, most wind-resistant variety so far available. Notes are also supplied on two of the more promising varieties named earlier—Keauhou and Kakea. Other earlier named varieties, Nuuanu, Pahua and Kohala, are now considered to have certain limiting qualities and should probably be planted only in areas where they have been found to perform especially well.

4292. KESSLER, G. M.
The macadamia nut in Hawaii.
Fruit Var. hort. Dig., 1951 (issued Feb. 1952), **6**: 54-6, illus.

Among approximately 80 known varieties of macadamia, only 5, Pahau, Keauhou, Nuuanu, Kakea and Kohala, are grown in Hawaii.

4293. SCHROEDER, C. A.
The macadamia in California.
Calif. Citrogr., 1952, **37**: 173.

Studies on seedling macadamia trees have shown marked variations in average yield, percentage of kernel, nut size and oil content. The best trees in southern California yield 125-150 lb. nuts per annum, containing 35-38% kernels with 65-75% oil; in size they range from $\frac{3}{4}$ to $1\frac{1}{8}$ in. in shell diameter, 48-58 nuts weighing 1 lb. Fifteen of these selections as well as the best clones from Hawaii are now under trial at Los Angeles.

Passion fruit.

4294. MCKNIGHT, T.
A wilt disease of the passion vine (*Passiflora edulis*) caused by a species of *Fusarium*.
Qd J. agric. Sci., 1951, **8**: 1-4, illus.

A fusarium distinct from *F. bulbigenum* causes a serious wilt disease of passion fruit in south-eastern Queensland. The symptoms, which are described, include vein clearing in the youngest unfolded leaf of seedlings and leaf shedding. Small scale tests have shown that *Passiflora alba* and *P. suberosa* are susceptible, while *P. foetida*, *P. flavicarpa* and some plants of the Hackett's Mammoth strain of *P. edulis* show some resistance. It is suggested that a solution of the problem may be obtained either by selecting resistant individuals of *P. edulis* or by grafting *P. edulis* onto resistant stocks, if interspecific compatibility can be established.

Persimmons.

4295. ŠEFTELJ, I. M.
The Caucasian persimmon in Tadžikistan. [Russian.]
Priroda, 1952, **41**: 3: 104-5.

The Caucasian persimmon or date plum, *Diospyros lotus*, which grows wild in Tadžikistan, is sometimes used as a rootstock for the oriental persimmon [*D. kaki*] and itself yields abundant crops of sweet fruit suitable for eating fresh or for drying.

4296. DE ALMEIDA, J. R., AND VALSECHI, O.
Fermentação da sapota preta. **(Fermentation of *Diospyros ebenates*.)**
Rev. Agric. Piracicaba, 1952, **27**: 29-34.

Diospyros ebenates [*ebenaster*?], the Mexican " zapote negro ", is only grown in Brazil on a small scale. The composition of the fruit is tabulated and notes are given on the method of fermentation and the composition of the brandy made from it.

4297. MEZZETTI, A.
Altre osservazioni sulla " defogliazione del kaki ". **(Further observations on persimmon leaf fall.)** [English summary 11 lines.]
Boll. Staz. Pat. veg. Roma, 1950 (issued 1952), **8**: 75-8, bibl. 1.

The leaf fall disease of persimmon (*Diospyros kaki*), previously reported by the author [see *H.A.*, 18: 2537 and 20: 3178] has now been found in 14 Italian provinces. Trees belonging to the *lycopersicum* group are severely affected but some trees of the *costata* group appear to be resistant. It is believed that leaf fall is caused by a filterable virus which is spread by grafting and by other means not yet determined. The disease lasts 1-2 years and the trees then show some recovery. It is suggested that nitrogen fertilizers should be applied in spring and bordeaux mixture in May as stimulants.

4298. FARMER, A.
Pests and disease of persimmons in New Zealand, and their control.
Orchard. N.Z., 1952, **25**: 4: 4-9, bibl. 2, illus.

Observations at the Fruit Research Station, Auckland, on 22 varieties of the oriental persimmon (*Diospyros kaki*) have shown that they are attacked by a number of diseases and pests, which are described with recommendations for control under: grey mould (*Botrytis cinerea*), blast (*Pseudomonas syringae*), leaf-roller caterpillars (*Tortrix* spp.), tree borer (*Oemona hirta*), scale insect (*Aspidiotus hederae*), mealy bugs (*Pseudococcus* spp.), green vegetable bug (*Nezara viridula*). Miscellaneous troubles mentioned are bird nuisance, pollination troubles, wind, skin blemishes, varietal defect of Tanenaski fruits, and lichens.

Tung.

(*See also* 3767, 4204, 4305, 4548.)

4299. BOURLET, G.
Oléagineux et huiles de Madagascar. 1. L'*Aleurites fordii*. **(Oil-yielding plants and oils of Madagascar. 1. *Aleurites fordii*.)**
Oléagineux, 1952, **7**: 259-62, illus.

The tung oil industry in Madagascar is expanding. The tree grows best at elevations of 1,000-1,600 m. under an annual rainfall of 1,000-2,000 m.m. Spacing is either wide with interplanting of field crops or close at about 500 trees per ha. Nursery, planting, maintenance and manuring practices are described. Mechanical cultivation is employed to control weeds. Yields average 5 kg. of dry fruits per tree (with an 18% oil content) or 450 kg. of oil per ha.

4300. MCKINNEY, R. S.
Improved methods for analyzing tung fruit adopted widely.
Res. Achiev. Sheet U.S. Dep. Agric. **R.A.S. 153(C)**, 1952, pp. 2.

In the new method outlined moisture and oil determinations, on which sales are largely based, are made on about 200 tung fruits ground whole. The method gives greater accuracy and saves time as compared with the older " component " method in which 25 fruits had first to be hulled and shelled.

Other crops.

(*See also* 4302d, e, l.)

4301. SCHROEDER, C. A.
The tuna or prickly pear in California.
Fruit Var. hort. Dig., 1951 (issued Jan. 1952), **6**: 26-8, 43, bibl. 2, illus.

The fruit of tuna, *Opuntia tuna*, botanically a berry, is eaten fresh or made into a jelly when fully ripe. Notes are given on its cultivation and harvesting in California, where there are about 100 acres still grown commercially. The better fruit types have no varietal names but are simply designated by their flesh colour, red and orange being preferred.

Noted.

4302.

a ALIBERT, H.
L'agrumiculture en Espagne. **(Citrus growing in Spain.)**
Fruits et Prim., 1951, **21**: 311-18, illus.

b BAJWA, B. S., AND KAURA, N. R.
Manuring citrus trees.
Indian J. Hort., 1952, **9**: 1: 29-32.
With F.Y.M. and N, giving yields and costs.

c BRICHET, J.
La sélection des porte-greffes en agrumiculture. **(The selection of citrus stocks.)**
Fruits et Prim., 1952, **22**: 85-8.

d CIPOLLA, G.
Nota sobre la enfermedad de la palmera datilera denominada " Diplodia ". **(Note on the diplodia disease of the date palm.)**
Idia, 1952, **5**: 49: 21-2, bibl. 2, illus.
Caused by *Diplodia phoenicum*.

e COBIN, M.
The lychee in Florida.
Fruit Var. hort. Dig., 1951 (issued Feb. 1952), **6**: 52-3, illus.
The only well tested variety in Florida is the Brewster or Royal Chen.

f FLANDERS, S. E.
Another parasite of purple scale [*Lepidosaphes beckii*] established in California.
Calif. Citrogr., 1952, **37**: 234, 256-7.
New purple scale parasite.
Calif. Agric., 1952, **6**: 5: 10, 14.
The parasite is *Physcus* sp.

g (FLANDERS, S. E.)
Climate and tree condition as factors in scale control.
Calif. Citrogr., 1952, **37**: 232, 254-6, bibl. in text but not listed.
A review.

h FLESCHNER, C. A., AND RICKER, D. W.
Potential mite pest on avocadoes.
Calif. Citrogr., 1952, **37**: 310.
Paratetranychus platani reported for the first time on avocadoes.

i DE HALPERÍN, D. R., AND OTHERS.
Industrialización de fruta de descarte. Producción de alcohol a partir de jugo de mandarina. **(Industrial use of fruit waste. Manufacture of alcohol from mandarin juice.)**
Idia, 1952, **5**: 49: 8-15, bibl. 15, illus., being *Publ. Inf. téc. Inst. Microbiol. Agric.* **1**.

j KEPNER, R. A.
Effectiveness of heaters for frost protection in citrus orchards.
Agric. Engng St. Joseph, Mich., 1952, **33**: 79-84, bibl. 2, illus.
For another account of the same study see *H.A.*, 22: 886.

k KLOTZ, L. J.
Prevention of gummosis in planting citrus trees.
Calif. Citrogr., 1952, **37**: 300-1.
When susceptible stocks are used.

l MIÈGE, E.
Le palmier-dattier au Maroc. **(The date palm in Morocco.)**
Rev. int. Bot. appl., 1952, **32**: 28-32.

m NAIR, P. V., PHILIP, C. J., AND RAMAKRISHNAN, T. A.
Lime juice as a stabiliser for vegetable oils.
Sci. and Cult., 1952, **17**: 295-6, bibl. 1.
Tested on sesame and coconut oils.

n REBOUR, H.
À propos d'une synonymie: il y a lime et lime . . . **(A case of synonymy: there are limes and limes.)**
Fruits et Prim., 1951, **21**: 407.

o REUTHER, W., SMITH, P. F., AND SPECHT, A. W.
Accumulation of the major bases and heavy metals in Florida citrus soils in relation to phosphate fertilization.
Soil Sci., 1952, **73**: 375-81, bibl. 15.

p SANCHEZ BUEDO, E.
The diseases, pests and hazards of growing citrus crops in Spain.
Plant Prot. Overs. Rev., 1952, **3**: 1: 13-17.

q SCHROEDER, C. A.
Floral development, sporogenesis, and embryology in the avocado, *Persea americana*.
Bot. Gaz., 1952, **113**: 270-8, bibl. 10, illus.

r SIMONNEAU, P.
L'orangeraie de Perrégaux. **(The orange groves of Perrégaux.)**
Fruits et Prim., 1951, **21**: 241-4.
There are 4,120 ha. under citrus in the Perrégaux plain, Algeria.

s SMIRNOFF, W. A.
Observations sur les ennemis naturels des cochenilles des agrumes au Maroc. **(Notes on the natural enemies of citrus scales in Morocco.)**
Fruits et Prim., 1952, **22**: 89-93, bibl. 5, illus.

t SMITH, W. P. C.
Brown rot of citrus. Collar rot or brown rot gummosis of citrus trees.
J. Agric. W. Aust. 1952, **1**(n.s.): 155-61, illus.

u SORBER, D. G.
Ethylene coloring of citrus successful over long period.
Res. Achiev. Sheet U.S. Dep. Agric. **R.A.S.152(C)**, 1952, pp. 2.

v WANDER, I. W., AND REITZ, H. J.
The chemical composition of irrigation water used in Florida citrus groves.
Bull. Fla agric. Exp. Stat. **480**, 1951, pp. 5-22, from title in *Soils and Ferts*, 1952, **15**, No. 1026.

w ZAMBETTAKIS, C.
Diplodia natalensis Pole Evans. Stem-end rot des agrumes. **(*Diplodia natalensis*. Citrus stem-end rot.)**
Rev. Mycol. Suppl. colon., 1951, **16**, pp. 7, from abstr. in *Rev. appl. Mycol.*, 1952, **31**: 237.
Its symptoms, cause and control.

x ZENTMYER, G. A.
Avocado diseases in Mexico and Costa Rica.
Yearb. Calif. Avocado Soc. for 1951, pp. 103-4.

y ZENTMYER, G. A., AND POPENOE, W.
***Phytophthora cinnamomi* on avocado in Honduras.**
Yearb. Calif. Avocado Soc. for 1951, p. 102, bibl. 4.
[See *H.A.*, 22: 858.]

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 3349, 3366, 4501r, u, 4502l, w, 4518, 4519, 4520, 4522, 4531, 4536.)

4303. CONDOMINAS, G., AND HAUDRICOURT, A.
Première contribution à l'ethnobotanique indochinoise. Essais d'ethnobotanique Mnong gar (Protoindochinois du Vietnam). **(First contribution to the Indo-Chinese botanical ethnology. A study of the botanical ethnology of the Mnong gar (Proto-indochinese of Vietnam).)**
Rev. int. Bot. appl., 1952, **32**: 19-27, 168-80.
This study of the plants of the region inhabited by the Mnong gar is concerned with the following: I. The geographical situation. II. Plants of economic importance to the Mnong gar. III. Food plants cultivated (including some not directly of nutritional but of ritual importance). IV. Plants utilized but not cultivated, (1) food plants, (2) fruits, (3) plants useful for textiles and wicker-work, (4) plants used in rituals and magic, (5) medicinal plants, (6) poisonous plants, (7) plants used for fuel and illumination and for building. The uses to which the various plants are put are noted and the vernacular and scientific names are given.

4304. Mysore.
Facts about Mysore. Agriculture.
Principal Information Officer, Government of Mysore, [1951?], pp. 40, illus.
The subtitle of this booklet is " Progress of Agriculture in Mysore during the period from 1945-46 to 1950-51 ". It gives a semi-popular account of agricultural policy, development, research and education, and includes maps showing the distribution of the principal crops, which include oil seeds, coconuts, condiments and spices, sugar cane, coffee, drug plants and various fruits.

4305. Anon.
Agriculture research now being carried out in Nyasaland.
Nyasaland agric. quart. J., 1951, **10**: 68-72.
Investigations and experiments listed include 11 on tea, 10 on tung and 5 on tobacco.

4306. Paul, W. R. C.
Notes on legumes. II.
Trop. Agriculturist, 1951, **107**: 225-8.
Further notes are presented on legumes under trial, mainly at Peradeniya, as cover crops and forage plants. These include *Psophocarpus palustris* and *Glycine javanica* which show promise in the wet lowland zone, the indigenous dry lowland species *Indigofera enneaphylla*, *Tephrosia pumila* and *Alysicarpus rugosus*, and the central American forage plant *Desmodium distortum*. Varieties of pigeon pea, *Cajanus cajan*, have at last been found which will seed satisfactorily in Ceylon.

4307. Martyn, E. B.
Diseases of economic plants in Trinidad and Tobago.
J. agric. Soc. Trin. Tob., 1951, **51**: 475-506, and *Bull. Dep. Agric. Trin. Tob.* **2**(n.s.), pp. 30, bibl. 32, illus.
This bulletin summarizes the information obtained over the past 30 years on the more important diseases of economic plants in Trinidad and methods of controlling them. Major crops include cacao, citrus, coconuts, and sugar cane. Minor crops include coffee, bananas, mangoes, papaws, vegetable crops, tonka beans, and immortelle shade trees.

4308. Tidman, D. A.
Some agricultural and horticultural problems in Brazil.
Plant Prot. Overs. Rev., 1951, **2**: 1: 20-32, illus.
Insect and fungal parasites of cacao, sugar cane, mango, coconut, citrus, tobacco, pineapple, coffee and bananas in Brazil and their control are discussed. Special mention is made of the control of leaf-cutting ants. [For a less comprehensive account, see *H.A.*, 22: 1855.]

4309. González Mendoza, R.
Resumen sobre experimentos de control químico de hormigas " arrieras ". (**A summary of experiments on the control of leaf-cutting ants.**)
Bol. inf. Columbia, 1952, **3**: 26: 34-6.
The following insecticides and concentrations were found 100% effective for control of leaf-cutting ants (*Atta* spp.) in experiments in Colombia: chlordane at 0·1%, toxaphene at 0·15%, aldrin at 0·0185%, dieldrin at 0·014% and heptachlor at 0·013%. Small nests require 24 l. solution, medium 80 l., and large more than 80 l. After treatment all perforations and holes in the nests should be covered up and the soil should be lightly watered if it is very dry.

4310. González Mendoza, R.
Control de la hormiga " arriera ". (**Control of leaf-cutting ants.**)
Rev. Caf. Colombia, 1951, **10**: 3741-9, from abstr. in *Bol. inf. Colombia*, 1951, **2**: 22: 4.
Leaf-cutting ants (*Atta* spp.) do serious damage to coffee. Their biology, depredations and control are described. Complete control is obtained by spraying with chlordane, toxaphene or lead naphthenate.

Bananas.

(*See also* 4501k, 4502e, 4522.)

4311. Richards, A. V.
Banana cultivation in Australia.
Trop. Agriculturist, 1951, **107**: 229-35, bibl. 1, illus.
This general account of the industry includes information on varieties, methods of planting, manuring, cultivation, desuckering, spraying, harvesting and packing, the control of bunchy top and the destruction of old plantations by injecting 2,4-D or MCPA.

4312. Gandhi, S. R.
Banana culture in western India.
Poona agric. Coll. Mag., 1952, **42**: 180-209, bibl. 6, illus.
General instructions are given. The most important varieties grown in Western India are *Musa sapientum*—Harichal or Bombay-Green, Lal Velchi or sour, Safed Valchi or Lady Finger, Mutheli or Apple, Lal Kel or red, Rajapuri or hill; *Musa cavendishii*—Basra Dwarf; and *M. paradisiaca*—Rajeli or common plantain. Descriptions are given of these.

4313. Simmonds, N. W.
La banane à la Guadeloupe et à la Martinique. (**The banana in Guadeloupe and Martinique.**)
Fruits d'Outre Mer, 1952, **7**: 67-9.
The banana industry of Guadeloupe and Martinique is briefly described. It rests upon 3 members of the Cavendish group, the varieties Grande Naine, Lacatan and Robusta. The two latter are difficult to distinguish in the field. Poyo is a hybrid of Lacatan and Robusta with Robusta predominant. A list of some 45 other varieties grown is given.

4314. Simmonds, N. W.
Prospects of banana growing in Trinidad.
J. agric. Soc. Trin. Tob., 1951, **51**: 418-23.
Some of the characters of the Gros Michel, the Lacatan and related varieties, and varieties immune to Panama disease and leaf spot being raised under the Banana Breeding Scheme are discussed briefly. The development of a new disease resistant seedling banana represents the only practicable basis for the establishment of a banana industry in Trinidad, but even so it

is doubtful whether the development of an export industry would be feasible.

4315. NAYAR, T. G.
On the occurrence of *Musa banksii* (F. Muell) var. *singampatti* (Nayar T.G.).
Indian J. Hort., 1952, **9**: 1: 13-15, bibl. 2, illus.
A full description is given of a hitherto unrecorded variety of *M. banksii* found growing extensively at 4,000-4,700 ft. in the Singampatti hills, Tirunelvely, Madras. Points of difference between this variety and var. *samoensis* described by Cheesman [see *H.A.*, 19: 646b] are indicated.

4316. MACHADO S., A.
Cálculo y comprobación de la bondad de los abonos para cultivos especiales. I. Plantano dominico (*Musa regia*). **(Calculation of the nutrient requirements of special crops. I. The Dominican plantain (*Musa regia*).)**
Bol. inf. Colombia, 1952, **3**: 28: 24-32, bibl. 3.
Experiments carried out at the National Centre for Coffee Investigations, Chinchina, on the absorption and utilization of nutrients by *Musa regia* are reported. Tables are given showing the amounts of N, P, K, Ca, Mg, Mn, Fe_2O_3 and Al_2O_3, and ash in plants of different ages from 2½ to 14 months; the amounts of the various nutrients utilized by the stems, petioles, leaves and fruits respectively in 14 months; and the chemical composition of the soil in which the plants were growing. The data are discussed. Among the conclusions drawn are the following: (a) assimilation of the principal nutrients is slow when the plants are from 2½ to 5 months old, but increases rapidly from then on. (b) From 5 to 7½ months, available N, P and Mn are especially necessary. (c) From 7½ to 10 months, i.e. from the beginning of flower formation to flowering the need for soluble P and Mn is increased and abundant Mg and Ca is required. (d) From 10 to 12½ months, i.e. at the beginning of fruit formation and the growth of new shoots, sufficient quantities of soluble P and large quantities of Mn are required. (e) From 12½ to 14 months, during fruit development, abundant quantities of readily available nutrients are needed, especially K and Ca. N and Mg requirements are also high.

4317. CARDEÑOSA B., R.
Investigaciones sobre la "rayadilla" del platano (*Musa* sp.) en Colombia. **(Research on the rayadilla disease of plantains in Colombia.)**
Acta Agron. Palmira, 1952, **2**: 1-21, bibl. 28, illus.
The rayadilla disease of plantains was first reported in Colombia in 1939 and assumed serious proportions in 1944. Its symptoms are dwarfing, uneven chlorosis, change of leaf texture, rosette condition and root rot, but diseased plants do not always show all the symptoms. The results of 4 experiments conducted to determine the cause of the disease were: (1) applications of saltpetre to the soil had no effect on diseased plants except to improve their growth slightly; (2) attempts to transmit a possible virus were unsuccessful; (3) the root systems of plants grown in sterilized soil were healthy while those of plants grown in unsterilized soil were heavily infected with the nematodes *Heterodera marioni* and *Tylenchus similis*; (4) diseased rhizomes in clean soil produced normal plants with no symptoms of the disease. The fact that it has not been possible to transmit the disease does not exclude the possibility that it may be of virus origin, but the author believes that nematodes may be the cause in association with some predisposing factor.

4318. THOMSON, A. G.
Banana research.
Food, 1951, **20**: 444-5.
The work that is being done in connexion with Panama disease, which is seriously threatening the banana industry in the West Indies, is outlined and the difficulties involved in breeding resistant varieties are indicated.

4319. HESSAYON, D. G.
Effect of auxins on the mycelial growth of *Fusarium oxysporum* var. *cubense*.
Nature, 1952, **169**: 803-4, bibl. 7, illus.
The two auxins tested, 3-indolylacetic acid and 3-indolylacetonitrile, were found to inhibit the mycelial growth of the fungus responsible for Panama disease of bananas, *Fusarium oxysporum* var. *cubense*, on agar plates. As 3-indolacetic acid occurs in seeds and 3-indolylacetonitrile production seems to be a general property of the Cruciferae, these auxins may, under certain conditions, have a considerable effect on the fungal population in the soil. It is also suggested that the freedom of plant apices from fungal infection may be due to auxin concentration at the growing point.—Manchester Univ.

4320. DEULLIN, R.
Chaleur dégagée par la banane en cours de transport. **(The heat generated by bananas during shipment.)**
Fruits d'Outre Mer, 1952, **7**: 64-6.
The method of packing bananas for export in French Guinea and the Ivory Coast consists of filling empty spaces in the fruiting stem with straw and then surrounding the whole with a layer of straw and Kraft paper. It was criticized as preventing the escape of the heat generated by the fruit during maturation under refrigeration, but experiments show that the atmosphere inside the package is favourable to good keeping and that heat escapes satisfactorily provided there is adequate air circulation outside the package.

Cacao.

(*See also* 4501f, 4525, 4558, 4563.)

4321. HERNANDEZ S., A.
Estudio de la zona cacaotera del estado Yaracuy. **(A study of the cacao district of the State of Yaracuy, Venezuela.)**
Agric. venezol., 1950, **15**: 147: 24-7, illus. [received 1952].
Information is given on the types of holding, production and yields, varieties grown, soils, rainfall, shading, cultivation and fermentation practices, pests and diseases. The costs of production are analysed.

4322. Evans, H.
Investigations on the propagation of cacao.
Trop. Agriculture, Trin., 1951 (issued 1952), **28**: 147-203, bibl. 17, illus.

Various factors involved in the rooting of cacao cuttings were studied in a comprehensive series of experiments, some of which have been described earlier [see *H.A.*, 21: 1026]. *The influence of root promoting substances:* The quick dip method was found to be convenient. β-indole butyric acid was superior to other hormones but a mixture of this substance with an equal quantity of α-naphthalene acetic acid was even more effective, the best concentrations being 8-10 mg. per ml. of 50% alcohol for stem cuttings and 4-5 mg. per ml. for single node or single leaf cuttings. *Experiments to initiate part or the whole of the rooting process on shoots still attached to the tree:* Various methods, including the introduction of hormone-treated match sticks and spraying leafy shoots with hormones, were tested but without success. Some of the factors involved in the successful rooting of marcotted shoots were, however, determined. *The part played by the green leaf in the rooting of cuttings:* The grafting of leaves of easy rooting cacao on cuttings of difficult rooting *Theobroma* spp. did not accelerate root formation. Conversely, when slips of bark of cacao clones were grafted onto leaf bearing cuttings of difficult species roots formed on the cacao bark within a month. It is tentatively concluded, therefore, that the main function of the leaf is to provide the cuttings with carbohydrates and to a lesser extent with soluble nitrogen compounds, and that it does not exercise a special formative effect which could not be replaced by major nutrients together with root-inducing synthetic hormones. There was some evidence that treatments applied to the base of the cuttings, notably immersion for 1 hour in water at 40° C., could be used to stimulate the formation of root primordia. *Nutritional factors in the rooting of cacao:* Among I.C.S. clones differences in ease of rooting could be attributed mainly to nutritional differences. The procedure of introducing nutrients by standing cuttings in a solution was abandoned in favour of introduction through the leaves. Among various nutrients introduced in this way sucrose was by far the most effective. Even defoliated cuttings supplied with sucrose rooted, though they failed to become established. *The growth of cacao stems in aseptic culture:* A method of culturing leafless stem segments was developed; new tissue was formed but no roots were produced. *The effect of external conditions during rooting:* Among external factors, light, temperature and the air-moisture relationships of the rooting media were the most important. Optimal external conditions for rapid rooting were determined and different rooting media compared. *The technique of raising plants from cuttings:* Details are given of the rooting of stem and leaf cuttings in closed propagators and in outside beds under mist spray. Mineral deficiencies in the parent trees, most commonly of N and Fe, resulted in more rapid deterioration of leaves in the propagation beds; nursery material responded quickly to spraying with 1-2% urea and 1% iron sulphate. New methods of hardening cuttings were developed and the qualities of potting mixtures were studied. The suitability of the methods described for large scale commercial propagation is discussed. Methods of transporting rooted cuttings overseas were also investigated, as was a method of bench grafting cacao.

4323. Chamorro M., R.
Contribución al problema del sombrio en cacao. **(Contribution to the problem of shade in cacao.)**
Acta Agron. Palmira, 1952, **2**: 23-48, bibl. 56, illus.

Experiments conducted at the Palmira Experimental Station, Colombia, on transpiration in cacao under different degrees of shade showed that: (1) the rate of transpiration is inversely proportional to the degree of shade; (2) plants in full sunlight transpire about 50% more water than those under 90% shade; (3) transpiration is highest between 10 a.m. and 3 p.m.; (4) transpiration from the stomata virtually ceases at night; (5) variations in the rate of transpiration, dependent on shade, cause structural and morphological changes in seedlings, especially in the leaves; (6) with increased shade the number of stomata per unit area of leaf surface diminishes; (7) plants in moist soil transpire more than those in dry soil; (8) shade is one of the principal factors in the control of loss of water by transpiration; (9) dependent on shade and on treatment (spraying the foliage or watering the soil) α-naphthalene-acetic acid increases or decreases transpiration; spraying the leaves reduces transpiration in the case of trees under 50% shade; (10) in cacao plantations in the Cauca valley shade should be maintained at 25-50%.

4324. Posnette, A. F.
Virus research at the West African Cacao Research Institute, Tafo, Gold Coast.
Trop. Agriculture, Trin., 1951 (issued 1952), **28**: 133-42, bibl. 13.

The author discusses briefly investigations made since 1945 with reference to the nomenclature and classification of the viruses causing swollen shoot, symptoms, destructive effect, latent infection, vector species and their feeding times and biology, wild host plants, and the possibilities of control by roguing, eradicating wild hosts, eliminating vectors and by using resistant strains of cacao or inducing acquired immunity by the dissemination of mild strains of the virus.

4325. Thorold, C. A.
The epiphytes of *Theobroma cacao* in Nigeria in relation to the incidence of black-pod disease (*Phytophthora palmivora*).
J. Ecol., 1952, **40**: 125-42, bibl. 19, map.

The severity of black-pod disease is governed by humidity conditions that are probably related to rainfall, which ranges in the cacao areas in Nigeria from 45 to over 300 in. All the epiphytes identified as occurring on *Theobroma cacao* in Nigeria are listed, but only bryophytes and vascular plants are considered as possible climatic indicators. The method adopted for obtaining " epiphyte ratings " is described. Positive and significant correlations were found between mean epiphyte rating and rainfall; mean epiphyte rating and mean number of black pods per tree; and mean number of black pods per tree and mean number of total (healthy plus diseased) pods per tree. A significant negative correlation was found between

mean epiphyte rating and mean number of total pods per tree. Among other environmental factors which might affect epiphyte ratings, only illumination was found to be of importance; in relatively dry areas epiphytes are suppressed when natural shade reduces the illumination to $\frac{1}{56}$ of full exposure, but in wet areas they were little affected until light intensity became as low as $\frac{1}{300}$, such conditions being exceptional.

4326. COTTERELL, G. S.
The insects associated with export produce in Southern Nigeria.
Bull. ent. Res., 1952, **43**: 145-52, bibl. 6.
Losses in stored cocoa beans are almost entirely due to *Ephestia cautella* and *Lasioderma sericorne*, while palm kernels deteriorate mainly as a result of mould infection. Attention to storage routine and the trapping of adult moths are the standard control measures applied locally.

4327. SCHREUDER, W. H. E., AND SPOON, W.
Over fermentatie en na-fermentatie bij cacao. **(On fermentation and re-fermentation of cocoa.)** [English summary 1⅛ p.] Reprinted from *Cacao Choc. Suikerwerken*, 1952, **20**: 3: 51, bibl. 10, as *Ber. Afd. trop. Prod. kon. Inst. Tropen Amsterdam* **236**, pp. 8.
Some of the conclusions reached by the cocoa conferences held in Hamburg and London in 1951 are discussed, with special reference to Kaden's method of re-fermentation, and to the treatment of Java cocoa.

4328. FORSYTH, W. G. C., AND ROMBOUTS, J. E.
The extraction of cacao pigments.
J. Sci. Food. Agric., 1952, **3**: 161-4, bibl. 7.
The belief that the anthocyanins of the cacao bean are rendered alcohol-soluble during sun-drying by a photochemical process is shown to be without foundation. The extractability by ethanol depends on the extent to which the beans are dehydrated before the tissues are killed. When not sufficiently dehydrated at the time of killing, the vacuole contents can migrate and, when dried, are retained by adsorption. However, when quickly dehydrated, the coloured anthocyanins remain *in situ* in an alcohol-extractable form. In fresh cacao beans the anthocyanins are present as free colour-bases, free colourless pseudobases, and as ethanol-insoluble colourless complexes with other polyphenols. [Authors' synopsis.]—Colonial microbiol. Res. Inst., Trinidad.

4329. PEARMAN, R. W., RAYMOND, W. D., AND SQUIRES, J. A.
Cocoa husks from the Gold Coast as a source of furfural.
Colon. Plant. Anim. Prod., 1951, **2**: 209-10.
The furfural content of cocoa husks (pod-cases) seems to be too low to make production economic. No other constituents appear to be present in quantities sufficient to be attractive commercially.

4330. R., D.E.
The utilization of cocoa shell.
Colon. Plant Anim. Prod., 1951, **2**: 210-12, bibl. 13.
The various uses to which cocoa bean shells may be put in the U.K. and U.S.A. after separation from the beans include incorporation in animal feeding stuffs, as a fertilizer with fair P_2O_5 and K_2O contents, for the extraction of theobromine, as a cork substitute and possibly as a source of furfural and tannin.

Cashew.

4331. (MALAYA DEPARTMENT OF AGRICULTURE.)
Notes on current investigations, October to December 1951. Fruit. Cashew nut.
Malay. agric. J., 1952, **35**: 48.
It has been found that several solvents, including ether, trichloroethylene and carbon tetrachloride, can be used to extract cashew shell oil, provided that the shell has been cracked and broken to allow the solvent to penetrate.

Cinchona.

4332. WINTERS, H. F.
Fumigation of cinchona nursery soils.
Turrialba, 1951, **1**: 296-8, bibl. 6, illus.
The results of experiments indicated that cinchona plants grown in nursery beds that had been fumigated with chloropicrin had a better rate of survival, retained their foliage better, were larger at planting time and showed greater freedom from disease than plants grown in untreated soil or in soil treated with D-D or ethylene dibromide.—Fed. Exp. Stat., Mayaguez, Puerto Rico.

Cloves.

(*See also* 4530.)

4333. SHEFFIELD, F. M. L.
Studies of the clove tree. IV. Natural grafting and its bearing on sudden-death disease.
Ann. appl. Biol., 1952, **39**: 103-10, bibl. 8, illus.
Experimental grafting between cloves is very difficult with shoots and has so far proved impossible with roots. Use has therefore been made at the Clove Research Scheme, Zanzibar, of naturally occurring grafts in the study of sudden-death disease. Volunteer seedlings often grow up closely adpressed to old trees. If the old tree dies from sudden-death disease the sapling usually survives but occasionally dies almost simultaneously with the old tree. The saplings invariably had an independent root system but those which died were found to have their roots grafted to those of the old tree, while those which survived had no organic connexion with it. These observations cannot be reconciled with any but a pathogenic hypothesis as to the nature of the disease.

Coconuts.

(*See also* 4501b, 4502b, r, 4525, 4526, 4530, 4558.)

4334. GROGAN, F. O., AND BENNETT, A. J.
Copra in Papua and New Guinea.
Quart. Rev. agric. Econ., 1951, **4**: 151-7, map.
An economic survey of the copra industry in Papua

and New Guinea was carried out by the Bureau of Agricultural Economics in 1951. The findings of this survey will be published in detail later. The present paper gives a brief account of the development and economic importance of copra which is still by far the most important crop in the Territory.

4335. GOPALAN, K.
The coir industry in India.
Indian Coconut J., 1951, **5**: 21-30, illus.
Information is given on the production, export and internal consumption of coir yarn, mats, rope and other coir products. Extended facilities for retting and improved methods could lead to a large increase in production. Better grading and regulation of marketing are also necessary. There is a need, too, to investigate the possibility of using coir dust, now wasted, for making compressed boards, etc. A coir research institute should be established to study these problems.

4336. SALGADO, M. L. M.
Preliminary studies on the chemistry of cattle manuring on coconut estates.
Trop. Agriculturist, 1951, **107**: 218-24, bibl. 6.
Analyses of the manure and urine voided by cattle and buffaloes tethered under coconut palms confirm that this traditional local practice is a sound method of manuring coconuts, particularly when it is supplemented by applications of ash or by at least 1 lb. muriate of potash and 1-2 lb. of a phosphatic manure per palm.

4337. HANSEN, H. P.
On the so-called "unknown disease" and related diseases on coconut-palms in the West Indies.
Plant Dis. Reptr, 1952, **36**: 66-7, bibl. 7.
Investigations have shown that this disease is not infectious, but is due to a toxic soil condition. A similar disease can be produced by poisoning the palms with small quantities of certain substances, e.g. cadmium chloride. As regards replanting coconuts in Jamaica after the recent hurricane of August 1951, the disease can be expected to turn up wherever sea-water has been carried onto soils consisting of residues of the Montpelier-limestone formations, especially soils of Radiolarian origin. Thus the disease may turn up in new sites, where it has never been observed before.

4338. VENKATARAYAN, S. V.
Root disease or anabe roga of arecanut and coconut palms.
Mysore agric. Calendar, 1949, pp. 25-7, illus. [received 1952].
The fungus *Ganoderma lucidum* is apt to cause a root, butt, and stem rot of arecanuts and coconuts in most parts of Mysore on soils with a pH range of 3·0 to 7·0. The fungus grows best at about pH 6·5. Waterlogging predisposes the trees to infection. The only treatment showing any promise of success is to remove 6-9 inches of soil in a circle of 2-3 ft. radius around the base of a palm showing early symptoms of infection, apply 2-3 lb. of sulphur dust and replace the soil. Dead and dying trees should be dug out and burnt.

Coffee

(*See also* 4501d, i, l, p, 4502a, d, k, q.)

4339. CASTRO A., M. F.
Métodos de mejoramento del cafeto seguidos en algunas estaciones experimentales. **(Methods of improvement of coffee in use at some experimental stations.)**
Bol. inf. Colombia, 1951, **2**: 23: 30-40, bibl. 9.
An account is given of methods of improvement of coffee, and especially the selection of *Coffea arabica*, in use in Tanganyika, at the Interamerican Institute of Agricultural Sciences, Turrialba, Costa Rica, at the Agronomy Institute, São Paulo, Brazil, and at the National Centre of Coffee Research, Chinchina, Colombia.

4340. CARVALHO, A.
Características das principais variedades de café. **(Characteristics of the principal varieties of coffee.)**
Diário S. Paulo, 28 Dec. 1951, reprinted in *Bol. Super. Serv. Café, S. Paulo*, 1952, **27**: 60-2.
The following varieties of *Coffea arabica* are briefly described: Nacional, Sumatra, Amarelo de Batucatu, Maragogipe, Bourbon, Bourbon amarelo, and Caturra.

4341. KRUG, C. A., CARVALHO, A., AND MENDES, J. E. T.
Taxonomia de *Coffea arabica* L. III. *Coffea arabica* L, var. *anormalis*. **(Taxonomy of *Coffea arabica* L. III. *Coffea arabica* L. var. *anormalis*.)** [English summary ½ p.]
Bragantia, 1950, **10**: 335-43, bibl. 6, illus. [received 1952].
In 1938 a coffee plant was found at the Central Experiment Station coffee nursery, Campinas, which showed abnormal leaves and irregular branching. As this variant appeared in an F_2 population derived from a normal coffee plant, it is supposed to have originated by mutation. A study of the progeny of this mutant, obtained through artificial self-pollination, revealed that it is heterozygous for one pair of genes, which so far had not been encountered in *C. arabica*. Plants homozygous for this gene are described in the present paper as a new variety, *anormalis*. The branching habit of the *anormalis* variety is very abnormal, showing an excess of orthotropic branches arising at various nodes. The lateral branches are also abnormal. The leaves are extremely variable in shape and size; sometimes they have two apices; others are deeply incised often to the base of the petiole. The number of leaves at each node may vary from 1 to 4; the stipules, located between the insertion regions of the petioles, are large and irregularly shaped. The flowers show abnormalities in all their organs. The fruits are usually normal in shape and have a rather large disc. Abnormal seeds, of the "shell" (*concha*) type, frequently occur. A similar abnormal coffee plant was also found in a field planting in the Avaré county. It seems probable that it also arose through mutation and that it possesses the same gene which determines the characters of the *anormalis* variety found in Campinas. [From authors' summary.]

4342. CARVALHO, A., AND KRUG, C. A.
Genética de *Coffea*. XIII—Hereditariedade do característico erecta em *Coffea arabica* L. **(The genetics of *Coffea*. XIII. The inheritance of the *erecta* character in *Coffea arabica*.)** [English summary ¼ p.]
Bragantia, 1950, **10**: 321-8, bibl. 5, illus. [received 1952].

The *erecta* mutant of *Coffea arabica*, which probably originated in Java, differs from normal coffee plants in having upright-growing lateral branches instead of plagiotropic ones [see also abstract 4350]. Although the main shoot and lateral branches grow in the same direction, the dimorphic nature of the branches still persists. The *erecta* character was found to be conditioned by one pair of dominant genes *Er Er*. It is not known whether all *erecta* plants of different origins have the same dominant genes, but the question is being investigated. Of all genes so far studied in *C. arabica*, *Er* is the most completely dominant, the heterozygote being indistinguishable from the homozygote.

4343. KRUG, C. A., AND ANTUNES FILHO, H.
Melhoramento do cafeeiro. III. Comparação entre progênies a híbridos da var. *bourbon*. **(Coffee breeding. III. A comparison between the progenies and hybrids of the variety Bourbon.)** [English summary ¾ p.]
Bragantia, 1950, **10**: 345-55, bibl. 13 [received 1952].

A comparison was made at the Campinas Institute of Agronomy between the selfed progeny of *Coffea arabica* var. Bourbon and the hybrids derived from crossing the same mother plants that were used for selfing. The results showed that in the hybrids no heterosis occurred as regards yield or plant height, and that selfing had no detrimental effect on these characters. This is thought to be due to the fact that *C. arabica* is predominantly autogamous and that the parent plants used in this study had a common origin and were most probably of similar genetic constitution.

4344. SCHWEIZER, J.
Aanvullende gegevens over BP-Robusta-koffie als plantmateriaal. **(Supplementary data on BP robusta coffee as planting material.)**
Bergcultures, 1952, **21**: 61-9.

Tables are given showing the performance of a large number of BP coffee clones, and the results of extensive trials in Java of 6 selections are recorded. Of these, BP 46 and BP 358 are provisionally recommended as planting material.

4345. NARASIMHASWAMY, R. L.
Leaf disease resistance and its importance in coffee.
Indian Coffee, 1952, **16**: 26-8.

Although spraying with bordeaux mixture against *Hemileia vastatrix* has become an established practice in South India the demand for disease resistant plants has become more insistent. All types of arabica have proved susceptible. Among resistant species only robusta has proved acceptable and the acreage planted to it has doubled in the last 10 years. Work at the Balehonnur Experimental Station is directed towards selecting resistant interspecific hybrids between arabica and liberica. The S.333 seedlings (S.31×Kent) are particularly promising, some plants yielding as much as 13·5 cwt. per acre, and it is proposed to multiply the best of these from cuttings.

4346. PRATT, A. M.
Coffee nurseries.
Ext. Circ. Dep. Agric. Jamaica **48**, 1952, pp. 6, illus.

Suggestions are made for the siting of nurseries, size of seed beds, shade, preparation of seed, sowing, mulching, weeding, lifting and packing seedlings, and the control of pests and diseases under Jamaican conditions.

4347. TRIANA, J. V.
Propagación vegetativa del *Coffea arabica*. **(Vegetative propagation of *Coffea arabica*.)**
Bol. inf. Colombia, 1951, **2**: 20: 29-34, bibl. 3, illus.

Experiments with non-woody and semi-woody cuttings of various lengths showed that the non-woody part just below the two terminal nodes of a shoot is the best material, that the most suitable length is one node, and that cattle urine extract stimulates root development.

4348. MENDES, J. E. T.
Multiplicação do cafeeiro por estacas com uma fôlha. **(Propagation of coffee by one-leaf cuttings.)** [English summary 8 lines.]
Bragantia, 1950, **10**: 209-11, bibl. 5, illus. [received 1952].

A new method of propagation of the coffee plant by stem-cuttings has been developed. Single-node stem pieces with two opposite leaves were split longitudinally in two halves. These were treated with a hormone and rooted in a hot frame in washed sand. Stem pieces from orthotropic branches gave rise to normal plants, whereas cuttings from plagiotropic branches gave plants with only lateral branches. The one-leaf stem-cuttings may be used advantageously in studies of bud mutation induced by colchicine or other methods. [From English summary.]—Campinas Institute of Agronomy.

4349. ANON.
Sobre los trabajos en experimentación cafetera en la Granja de Blonay. **(Coffee research in Granja de Blonay.)**
Bol. inf. Colombia, 1951, **2**: 22: 24-8.

Current coffee growing research at Granja de Blonay Experimental Station (steeply sloping, shallow soils; 1,300 m. altitude) in North Santander Province, Colombia, is described. In a spacing trial yield at 2 m. by 2 m. was nearly twice that at 2·5 by 2·5, about thrice that at 3 by 3 and over 5 times that at 3·5 by 3·5. In a trial of organic manures yields per tree were: (1) bonemeal plus 15% sulphur—1,752 g. of beans; (2) bonemeal—1,005 g.; (3) coffee pulp—970 g.; (4) stable manure—505 g.; and (5) control—190 g.

4350. CARVALHO, A., KRUG, C. A., AND MENDES, J. E. T.
O dimorfismo dos ramos em *Coffea arabica* L. **(Dimorphism of the branches of *Coffea arabica*.)** [English summary 1 p.]
Bragantia, 1950, **10**: 151-9, bibl. 15, illus. [received 1952].

When the tip of an upright-growing (orthotropic) branch of coffee is grafted a normal plant is obtained, but when the tip of a lateral (plagiotropic) branch is used the resulting plant will have only lateral branches. A series of investigations on this phenomenon was carried out at the Campinas Institute of Agronomy on the Bourbon variety of coffee, and the preliminary results are presented in this paper. It was found that buds which develop into lateral (plagiotropic) branches usually appear first in the axils of the 8-11th pairs of leaves on the main stem, although in plants of a certain genetic constitution they appeared first in the axils of the 33rd pair of leaves. These axils also contain 2 or 3 other buds which may develop into orthotropic branches when the main stem of the plant is cut back. The leaf axils of lateral, plagiotropic branches contain flower buds and buds which give rise to plagiotropic branches only and never to orthotropic branches. The differentiation into plagiotropic branches was found to be permanent and irreversible, as was shown by experiments with grafting and cuttings. A special study was made of *Coffea arabica* var. *erecta*, a dominant mutant, which has upright-growing lateral branches. It was found that dimorphism exists even in this variety, as grafts from lateral branches only formed low shrubs, although the branches grew vertically. Normal plants were only obtained by using the tips of orthotropic branches as scion wood. Several hypotheses are presented to explain this phenomenon.

4351. AHRENS, L., AND VANDENPUT, R.
Contribution à l'étude de la conduite du caféier robusta en tiges multiples. **(Contribution to the study of the multiple-stem training of robusta coffee.)**
Bull. agric. Congo belge, 1951, **42**: 575-616, illus.

The technique described was evolved after large scale experimentation with 16-year-old robusta trees which had been converted to multiple-stem plants by coppicing at the age of 12. The necessary annual generation of healthy coppice shoots is obtained by bending each year's shoots into a horizontal position, a process which not only permits the entry of enough light for free growth of replacement shoots but facilitates harvesting. "Formation bending" takes place when the first year's coppice shoots are about 1·2 m. long, and consists of fixing the top third of each shoot in a horizontal position, the shoots being spread out like the spokes of a wheel. Subsequent coppice shoots are suppressed until some months before the main harvest when a second generation of 4-6 coppice shoots is permitted to come away. Shortly before the harvest these in turn are bent. This "replacement-and-harvest bending" then occurs annually. The older fruiting shoots are not removed until they become damaged or exhausted. The technique requires 39-45 man-days per ha. per annum.

4352. ANON.
Podas del cafeto. **(Pruning coffee.)**
Bol. Ext. Fed. nac. Cafeteros Chinchina-Caldas **12**, 1951, pp. 8.

Four types of pruning are practised in Colombia, viz. (1) transplanting pruning—root pruning; (2) formation pruning—the beheading and bending of the plant and the removal of the lower branches; (3) cleaning pruning—a general cleaning-up of the tree after every 2-3 harvests; (4) rejuvenation pruning—the coppicing of old plants and the training of 1-2 new stems. Of the many systems of formation pruning seven, which have been the subject of experiments at the National Coffee Research Centre, are described with diagrams, viz. (a) and (b) uncontrolled and controlled free growth; (c) and (d) the Colombia system with 1 and with 2 main stems; (e) the Guatemala system; (f) the Costa Rica system; and (g) two plants per site. Experiments show that rejuvenation pruning is inadvisable, that cleaning pruning is essential in every case, and that suitable spacings for different methods of formation pruning are: free growth—2·5 m. by 2·5 m., 2 plants per site—4 m. by 4 m., the Colombia single stem system—3 m. by 3 m.

4353. ORTEGA, P.
Clima y terrenos apropiados para el cultivo del café. **(Climate and soils suitable for coffee growing.)**
Cult. Café Honduras, 1951, from abstr. in *Bol. inf. Colombia*, 1952, **3**: 26: 12-13.

Coffee requires a fresh, humid climate. The best quality is obtained at altitudes above 2,000 ft., although good quality coffee is found at lower levels. Experiments have shown that the most suitable soils are black humus soils. Soils rich in nitrates are not to be recommended, as the nitrogenous salts crystallize in the vascular tissues and have a toxic effect.

4354. S., A. M.
Diario de nutrición del cafeto. **(Analysis of coffee nutrition.)**
Bol. inf. Colombia, 1952, **3**: 27: 39-40.

Tables are given showing the weight of the various parts of a coffee tree, one year after planting, the amounts of N, P, Ca, Mg, and K in the various parts, and the balance of nutrients in young leaves.

4355. (VARGAS B., S.)
Campos de cooperación en Cundinamarca. **(Cooperative [coffee] trials in Cundinamarca.)**
Bol. inf. Colombia, 1951, **2**: 20: 26-9.

A replicated experiment was undertaken by the Colombian National Centre of Coffee Research in the Cundinamarca district (annual rainfall 1,000 m.m., elevation 1,650 m.) to study the effect of applying chemical fertilizers with or without added organic matter. There were 7 different treatments with N, P and K fertilizers at stated rates. Organic manure was applied at 13·5 l. per tree. Results are given for the first 2 years and indicate the desirability of applying organic manure and chemical fertilizers in combination. Another experiment to determine the response of coffee to Chile saltpetre and other mineral salts and the economics of their application involved treatment with N, NP and NPK. The application of the salts to soils deficient in organic matter reduced yields.

4356. FRANCO, C. M., AND INFORZATO, R.
Quantidade de água transpirada pelo cafeeiro cultivado ao sol. **(The amount of water transpired by unshaded coffee.)** [English summary 1 p.]
Bragantia, 1950, **10**: 247-57, bibl. 7 [received 1952].

In transpiration studies with coffee at the Campinas Institute of Agronomy, it was found that the determination of transpiration by weighing detached leaves did not give accurate results. Determinations were therefore made by weighing potted plants. Two- to three-year-old plants of the variety Bourbon were used in experiments carried out over a whole year. The highest daily rate of transpiration was 17·6 mg./dm² leaf surface/minute (over 12 hours). The average daily transpiration was 6·29 g./dm²/day and the total amount transpired by a coffee tree in one year was 7,273 litres.

4357. ANON.
Sombrío de cafetales. **(Shade in coffee plantations.)**
Bol. Ext. Fed. nac. Cafeteros, Chinchina-Caldas **11**, 1951, pp. 8, illus.
Shade is indispensable in coffee growing in Colombia, and this leaflet contains simple instructions to growers. Several leguminous trees are recommended for permanent shade and crotalaria, plantain and " guandul " beans for temporary shade.

4358. FRANCO, C. M.
A água do solo e o sombreamento dos cafèzais em São Paulo. **(Soil water and coffee shading in São Paulo, Brazil.)** [English summary 10 lines.]
Bol. Super. Serv. Café, S. Paulo, 1952, **27**: 10-19, bibl. 4.
The available soil water was measured in many shaded and unshaded coffee plantations in the state of São Paulo, Brazil. In all cases where the coffee did not thrive under shade, it was found that the soil in the main coffee root area was at wilting point. Competition for water between coffee and shade trees was shown to be the factor responsible for the failure of many shaded plantations, although on the clay Archean soils competition for water was not so serious as to make shading impossible.

4359. MOREAU, C., AND MOREAU, M.
Pyrénomycètes du caféier en Côte d'Ivoire. **(Pyrenomycetes of coffee bushes in the Ivory Coast.)**
Rev. Mycologie, Suppl. colon., 1951, **16**: 1: 12-80, illus., from abstr. in *Rev. appl. Mycol.*, 1952, **31**: 282.
Full technical descriptions [without Latin diagnoses] are given of 15 pyrenomycetes found on coffee in the Ivory Coast, including 11 new species, one new variety and one new form. Locally, the most strongly pathogenic fungi attacking coffee are *Macrophomina phaseoli* and *Auerswaldia excoriata* n.sp. causing root rots, *Gibberella xylarioides*, *Peroneutypa multistromata*, and *Tryblidiella rufula* causing tracheomycoses, *Nectria coffeigena* inducing canker, and *Hypomyces haematococcus* var. *breviconus* (collar rot).

4360. CASTAÑO A., J. J.
Resultados de la investigación sobre una enfermedad de café en el departamento de Nariño. **(Results of an investigation on a coffee disease in Nariño, [Colombia].)**
Bol. inf. Colombia, 1951, **2**: 21: 35-9, bibl. 2, illus.
A study was made of a disease of coffee trees observed in Nariño, which was characterized by a yellow leaf mottle; the fruits ripened prematurely and were of poor quality. From isolations and inoculation tests it was concluded that the disease was probably caused by the fungus *Colletotrichum* and that *Glomerella* was present as a saprophyte. During conditions of low temperature and low humidity the fungus developed vegetatively, while with high humidity and favourable temperatures fructification occurred. Severely infected trees should be burnt. Where infection is limited to 1 branch, this can be cut out and burnt. Prunings should never be left in the plantation as they serve as a source of infection. Good aeration should be ensured by paying attention to spacing and shade.

4361. RAYNER, R. W.
Coffee berry disease—a survey of investigations carried out up to 1950.
E. Afr. agric. J., 1952, **17**: 130-58, bibl. 35, illus.
Coffee berry disease, which appears to be caused by a form of *Colletotrichum coffeanum* that develops when susceptible berry tissues are available, was first recorded in Kenya in 1922 and has since been the most serious disease of coffee at altitudes over 5,500 ft. In a review of past investigations reference is made to studies on climatic factors, nutrition, numerous spraying trials, and differences in susceptibility among different types of coffee. The author postulates that, whilst climate does play an important part in determining the distribution of the disease, the physiological condition of the coffee bush may be the key factor and in so far as climate affects this its influence may be indirect rather than direct. Attempts to connect the disease with soil deficiencies and chemical composition of the trees have been unsuccessful. Although many fungicides have given some degree of control it has not yet been possible to develop an effective spray programme that is economic. Among types of coffee several resistant, but no immune, selections have been found, and further selection is being undertaken, especially in the variety Blue Mountain.

4362. LAVABRE, —.
Sur une plante pouvant héberger la punaise du caféier, *Antestia lineaticollis* S/sp. *intricata*. **(An alternate host plant of the coffee bug, *Antestia lineaticollis* subsp. *intricata*.)**
Agron. trop., 1952, **7**: 150-1.
It has been found in the Ivory Coast that all stages of antestia from egg to imago can develop on *Solanum anomalum*, which must now be added to the list of plants already known to harbour this pest.

4363. PRIMROSE, C.
An experiment against green bug.
Indian Coffee, 1952, **16**: 44-52.
An experiment carried out on a coffee estate is described in which 5 spray materials were compared for the control of green bug. All the materials gave a considerable measure of control, HETP at 1 lb. to 40 gal. water being slightly more effective and considerably cheaper than the others.

4364. González Mendoza, R.
Algunas consideraciones sobre el complejo simbiótico cóccido—hormiga del sistema radicular del cafeto. **(Notes on the symbiotic relationship between mealy bugs and ants on the root-system of coffee.)**
Bol. inf. Colombia, 1951, **2**: 15: 26-31, bibl. 12, illus.

The nature of the association between mealybugs (of the genera *Puto*, *Rhizoeccus*, *Eumyrmococcus* and *Ceroputo*) and ants (*including Solenopsis* and *Rhyzomyrma* spp.) on coffee roots is described. Biological control does not offer much hope of success. Incidence of the pests can be reduced by keeping down weeds and by not interplanting with alternate hosts such as cassava. Little is known about the resistance of different coffee varieties to attack. Experiments in chemical control have shown the following materials to be effective: (a) 74% emulsion of chlordane at 25%, (b) Agrocide 3 solution at 25%, (c) 10% Creolina plus 0·5% DDT, (d) 20% potassium cyanide plus 0·5% DDT, (e) 3% Otoba emulsion plus 0·5% DDT. The materials were applied to the affected areas after removing the soil round the trunk. Three applications of each were made at intervals of a fortnight. No differences have yet been observed in residual effect.

4365. Anon.
A progress report on the chemical control of the coffee mealybug and of its attending ant.
Mon. Bull. Coffee Bd Kenya, 1952, **17**: 129-32, illus.

A research team was commissioned by the Kenya Coffee Board to study chemical control of the coffee mealybug, *Pseudococcus kenyae*, and its attendant ant, *Pheidole punctulata*, in whose absence the mealybug is not a serious pest except on young suckers. Control of the ant was obtained with each of 2 unnamed insecticides. Applied once to the soil surface and the lower stems of the coffee bushes seven weeks prior to the long or short rains, the ant-killer completely prevented attendance until the rains ceased and the soil surface dried out. A second application to the lower stems alone gave further control for 3-4 months, provided contacts between trees and weeds were avoided. Suckers were found to provide excellent breeding sites for the mealybug leading to prolonged infection. Soil applications of the systemic insecticide Hanane gave inconsistent results against the mealybugs.

4366. Newcomer, E. J.
Relatório sôbre um estudo do programa de combate à broca de café no Brasil. **(A survey of the programme for control of the coffee berry borer in Brazil.)**
Bol. Super. Serv. Café, S. Paulo, 1952, **27**: 134-44, bibl. 20.

A critical evaluation of the methods used for control of the coffee berry borer in Brazil leads to the conclusions that the old method of hand picking fruits remaining on the trees after harvest is no longer economical; that dusting with BHC is very successful; and that when BHC is used properly there is no need to fear deterioration of flavour in the coffee.

4367. Silberschmidt, K.
Influência de doses elevadas de BHC no desenvolvimento de cafeeiros em vasos. **(The effect of heavy doses of BHC on the development of potted coffee plants.)** [English abstract 3¼ pp.]
Arq. Inst. biol. S. Paulo, 1950/51, **20**: 217-48, bibl. 29, illus.

Three-year-old coffee plants in pots were treated with 31 g. BHC powder (6% gamma isomer) in either a single or split application, either mixed with the soil or dusted on the plants. The effects are described in detail. Considerable damage was observed. Although the dose given was stronger than that recommended for control of the coffee berry borer, the possibility of accumulation of the toxin in the soil must not be overlooked. The previously suggested method of dusting the soil with small amounts of BHC with a high gamma isomer content does not seem advisable.

4368. Tosello, A.
A separação dos torrões de terra roxa do café, pelo magnetismo. **(The separation of lumps of "terra rossa" soil from harvested coffee by magnetism.)** [English summary ⅓ p.]
Bragantia, 1950, **10**: 259-74, bibl. 6, illus. [received 1952].

In the "terra rossa" districts of São Paulo and northern Paraná, Brazil, coffee harvested from the ground is often mixed with lumps of soil which cannot be easily separated from the beans mechanically and impart a red colour to them. A new machine called "catador Dr. Isay", which is equipped with rotating permanent magnets, has been tested for this purpose. It has been found very satisfactory for separating small lumps which are the most difficult to separate by other means.

4369. W., E.
Coffeingehalt nach Kaffeesorten. **(Caffein content of coffee varieties.)**
Gordian, Kaffee-u. Tee-Markt, 1951, **1**: 17: 8-9.

Some figures are given indicating that the caffein content of coffee of the same origin may vary considerably. The biggest differences were found in Colombia-grown produce, with from 0·8 to 3% caffein content.

Guavas.

4370. Kumar, L. S. S., and Ranade, S. G.
Autotriploidy in guava (*Psidium guajava*, Linn.).
Curr. Sci., 1952, **21**: 75-6, bibl. 2, illus.

Among a collection of Indian varieties of guava a seedless variety was found to have a somatic complement of 33 chromosomes. This is believed to be the first record of triploidy in guavas.—Coll. Agric. Poona.

4371. Malavolta, E., and Soubihe Sobrinho, J.
Nota prévia sôbre o teor de vitamina C em variedades brasileiras de goiaba (*Psidium guajava*, L.). **(A preliminary note on the vitamin C content of Brazilian varieties of guava.)** [English abstract ½ p.]
Rev. Agric. Piracicaba, 1951, **26**: 397-402, bibl. 7.

The ascorbic acid content was determined of some seedling guavas in the collection of the Campinas Institute of Agronomy. Individual trees showed great variation. The highest concentrations were found in fruits that were more or less green or were firm ripe, the maximum concentrations being respectively 144 and 130·8 mg. per 100 g. fruit. The vitamin C content was higher in the skin than in the outer pulp; the inner pulp had an even lower content. The average proportion in skin: outer pulp: inner pulp was 9 : 4 : 1. There appeared to be no relationship between ascorbic acid content and colour of fruit.

4372. Merle, P.
Note sur la multiplication végétative du goyavier. (Note on the vegetative propagation of the guava.)
Fruits d'Outre Mer, 1952, **7**: 72-3, bibl. 3, illus.

The form of vegetative propagation most commonly practised in French Guinea is aerial layering. The method is described and also a method of grafting that has been successfully developed since 1949.

4373. Prasad, N., Mehta, P. R., and Lal, S. B.
Fusarium wilt of guava (*Psidium guyava* L.) in Uttar Pradesh, India.
Nature, 1952, **169**: 753, bibl. 7.

A wilt disease of guava is rapidly spreading in Uttar Pradesh where this major fruit crop occupies an area of almost 70,000 acres. The authors isolated the causal agent and identified it as a *Fusarium* sp. belonging to the *oxysporum* group for which they propose the namr *F. oxysporum* f. *psidii*.—Agric. Inst., Anand, and Lab. Plant Pathologist, Kanpur.

4374. Andrade, A. C.
O contrôle da ferrugem da goiabeira por meio de pulverizações. **(The control of guava rust by spraying.)** [English abstract 1¼ p.]
Arq. Inst. biol. S. Paulo, 1950/51, **20**: 127-46, bibl. 4.

A series of experiments was carried out from 1943 to 1950 on guava trees at Campinas, Brazil, to control rust (*Puccinia psidii*). The following results were obtained. The sweet varieties, red and white, were more susceptible to rust infection than the sour. A direct relationship was observed between vegetative vigour and infection. The level of nitrogen in fertilizer mixtures did not affect susceptibility. Winter spraying was only useful as a control measure during wet winters when rust appeared early. Sulphur fungicides and organic fungicides such as Parzate and Fermate did not control the disease. Bordeaux mixture and home-made cuprous oxide afforded very good protection to the fruits, although the latter injured leaves and fruits. The control programme recommended consists of an application of bordeaux mixture (1 : 1 : 100) after the first winter rains and another when the trees sprout. The treatment should be repeated monthly until December or January. [For a shorter account see *H.A.*, 22: 1000.]

4375. Steiner, L. F.
Methyl eugenol as an attractant for oriental fruit fly.
J. econ. Ent., 1952, **45**: 241-8, bibl. 2.

Tests conducted in Hawaii with over 60 materials and several types of trap have shown methyl eugenol to be the most effective for attracting oriental fruit flies, particularly males. Citronella Ceylon, methyl iso-eugenol and iso-eugenol were also found to attract flies, but the other materials were comparatively ineffective. A combination of methyl eugenol and parathion made a successful poison bait, and in a guava plantation considerably reduced the number of infested fruits.

4376. Clancy, D. W., Marucci, P. E., and Dresner, E.
Importation of natural enemies to control the oriental fruit fly in Hawaii.
J. econ. Ent., 1952, **45**: 85-90, bibl. 7.

Of some 40 different species of parasites introduced, *Opius longicaudatus* and *O. incisi* imported from Malaya became established in Hawaii and are showing great promise for the biological control of *Dacus dorsalis*.

Mangoes.

(*See also* 4204, 4501c, 4525.)

4377. Horticultural Division, Ceylon.
Peterpasand, a new variety of mango for the low and mid wet zones.
Trop. Agriculturist, 1951, **107**: 184.

This small fruited mango, somewhat similar in quality to the Chembatan variety of Jaffna, is the only new variety that has flowered and set fruit consistently under the wet zone conditions of Peradeniya, being superior in this respect to the Gira or Parrot mango which is the local variety most suited to this area.

4378. Batra, H. N., and Renjhen, P. L.
The mango-fruit fly and its control.
Indian Fmg, 1952, **2**(n.s.): 1: 20-1, illus.

An outline is given of the life history of the mango fruit fly, *Dacus ferrugineus*, which attacks a wide range of fruits in India. Control measures recommended include the burial of all infested and dropped fruits, spraying with an emulsion of 1 gal. diesel oil, 1 lb. soft soap and 1 gal. water diluted in 8 gal. water, and the use of improvised traps (illustrated) baited with Clensel.

4379. Roy, R. S., and Ram, K. B.
Control of mango hoppers in Bihar.
Indian J. hort., 1952, **9**: 1: 33-40, bibl. 10.

Among various spray and dust materials tested from 1945-46 onwards for the control of mango hoppers, *Idiocerus* spp., Guesarol 550 (a DDT product) at 1 lb. per 40 gal. water proved the most effective. Two applications, one at the flower bud differentiation stage and the second about a week later, were sufficient. In 1950-51 power sprayers were used to treat about 26,000 trees at a cost of Rs. 1/2/– per tree.

4380. Smith, E. H. G.
The market for mangoes and mango products.
Colon. Plant Anim. Prod., 1951, **2**: 188-95, bibl. 18.

The literature on the cold storage, packing and shipment of fresh mangoes from India, Jamaica and other West Indian islands to the U.K. is reviewed, and the small-scale trade from these countries and South Africa is discussed. Exports of mango slices in brine and

mango pulp, notably from Jamaica, are larger, but the market for these and for fresh fruit and canned mangoes in the U.K. and other European countries would appear to be strictly limited.

4381. Das, N. B., and Banerjee, R. M.
Utilization of mango-seed kernel as a source of starch.
Sci. and Cult., 1952, **17**: 339-40, bibl. 2, illus.

Mango kernels contain on a dry weight basis 40-50% starch, 6-12% fat and 12-18% tannin. It is estimated that about 140,000 tons of starch might be obtained annually from this source in India. A process for the preparation of starch, including the removal of tannins, is described.

Oil palms.

(*See also* 3334, 4501e, x.)

4382. Jagoe, R. B.
The "dumpy" oil palm.
Malay. agric. J., 1952, **35**: 12-21, illus.

Among seedlings raised from "Deli" seed in 1920 were two low-growing, thick-stemmed palms, the better of which, E.206, was included in the final list of selections. The history of this palm and its family of selfed progeny is described and morphological comparisons with normal tall "Deli" palms are made. In addition to large girth accompanied by slow height increase which facilitates harvesting, the "dumpy" palms are characterized by a high rate of fruit-bunch production. A defect is a relatively low percentage of good fruits in a bunch, but this is not common to all of these palms and an improvement should readily be attained through breeding. It is hoped, too, in future breeding to incorporate the high percentage pericarp of the "tenera" type with the "dumpy" palm habit.

4383. Henry, P.
La germination des graines d'*Elaeis*. **(The germination of oil palm seeds.)**
Rev. int. Bot. appl., 1951, **31**: 565-91, and 1952, **32**: 66-77, bibl. 15, illus.

This study of the germination of the seeds of *Elaeis guineensis* is in two parts. Part I comprises morphological and experimental data on the seeds and their germination, with reference to: 1. morphology of the seed, 2. conditions necessary for germination, 3. the individual germination process, 4. the collective germination process, 5. variations and irregularities in germination, 6. methods of stimulating germination. Part II consists of practical data on germination: 1. germination under natural conditions, 2. preparing the seeds before sowing, 3. preserving the seeds, 4. sowing, 5. watering and the sorting of germinating seeds, 6. practical methods of stimulating germination, 7. the labour involved, costs, and yields. The general conclusions drawn indicate that (1) the nuts usually contain only one seed each, though 2 to 5 are sometimes found; (2) natural polyembryony occurs but is exceptional; (3) the thickness of the shell, which has been used in classification, has little taxonomic value; and (4) variations in germination capacity have been observed, due to external factors or to faulty technique. Certain trees regularly give less than 50% germination, others more than 90%. Trees originating in Dahomey have a seed germination capacity lower than that of trees of equatorial Africa or of the Congo.

4384. Frémond, Y., and Orgias, A.
Contribution à l'étude du systeme radiculaire du palmier à huile. **(A contribution to the study of the root system of the oil palm.)**
Oléagineux, 1952, **7**: 345-50.

The root system of the oil palm is superficial and spreading. Most of the absorbent part lies within a ring between 2 and 4 m. from the tree and at a depth of 5-35 cm., but there may be some variation with age and situation. Manure should be applied within this ring at a depth of 10-15 cm.

4385. (Malaya Department of Agriculture.)
Notes on current investigations, October to December 1951. Oil palm.
Malay. agric. J., 1952, **35**: 41-2.

Leaf analyses made monthly since March 1950 on 3 families of palms have shown families 97 and 207 to contain significantly more CaO than family 268. This corresponds with the analysis for bronzing, family 268 having the least bronzing. Conversely K_2O is significantly higher in 268 than in 207 and 97, showing that K_2O and the K_2O/CaO ratio are inversely related to bronzing. With young oil palms grown in hydroponic solutions with 4 different K_2O/CaO ratios, leaf K_2O did not decline much with reduced supplies of K_2O, but CaO increased markedly; the ratio K_2O/CaO in the ash varied from 5·29 for the high K_2O/CaO ratio supplied to 2·24 for the low ratio.

4386. Rancoule, A., and Ollagnier, M.
Fumure minérale du palmier à huile. **(The manuring of oil palms.)**
Oléagineux, 1952, **7**: 391-5, bibl. 3.

An earlier experiment at Dabou in the Ivory Coast [see *H.A.*, 20: 2030], showed responses in oil palms from applications of K. The results are given of two further trials at Pobé in Dahomey. In the first N, P and K were applied in 1944 and 1945 to chlorotic palms; P had no effect and N a slight effect, but the responses to K and to NPK were pronounced. Palms that received 1 kg. muriate of potash in each of the 2 years produced healthy foliage a year after the first application and gave yield increases in the second year of about 60%; by 1948, however, the effect had worn off. In the second experiment a randomized block lay-out was used to compare combinations of N, P, K and 2K on non-chlorotic palms. Significant increases in the weight of bunches per tree per annum, in the average weight of bunches and in the number of bunches followed most applications of K and 2K (1 and 2 kg. muriate of potash per tree), but there were no differences between the two levels of K and the effects of N and P were negligible. The K content of leaves was markedly increased by K fertilizers, although the increase was significantly lower in the presence of N; P increased leaf K slightly. The N and P leaf contents were not appreciably altered by any of the treatments. Differences in leaf K found at Pobé and Dabou are attributed to differences in climate, particularly rainfall.—I.R.H.O.

Papaws.

(*See also* 4502g, h.)

4387. Alonso Olivé, R. E.
Observaciones sobre el cultivo y mejoramiento de la fruta bomba. (*Carica papaya* L.) **(Observations on the cultivation and improvement of the papaw.)**
Bol. Estac. exp. agron. Santiago de las Vegas **67**, 1952, pp. 160, bibls, illus., $0.60.

This exhaustive review of work on the papaw is divided into 17 sections, each with its own bibliography: history and origin; names; composition and uses; botanical studies; types of flower; sexual forms; changes and variations of sex; sex inheritance; controlled pollination and hybridization; seed treatment and storage; characters of commercial varieties; parthenocarpy; ovocarpy; climate and soils; cultivation, harvesting and yields; vegetative propagation; pests and diseases.

4388. Kumar, V.
Studies in *Carica papaya* Linn. II. Sex-expression in some varieties.*
Indian J. Hort., 1952, **9**: 1: 20-8, bibl. 21, illus.

The 6 primary flower types and 4 primary sex types in papaws recognized by Storey (unpublished 1940 and see also *H.A.*, 8: 821) are outlined. Studies on the 5 varieties Bangalore, Washington, Honeydew, Honolulu and Ceylon are described, which have brought to light one new flower-type combination, and also confirm one of the combinations originally described by Higgins and Holt (1914) and since disputed by Storey. The combination of type V flowers on plants of sex-type IV described by Storey was not found, nor was any seasonal rhythm observed in plants of sex-type V. The percentages of plants of the 4 sex types and of bearing and non-bearing plants found in the 5 varieties are tabulated.—Fruit Res. Stat., Saharanpur.

4389. Singh, B., and Paharia, K. D.
Damping-off of papaya (*Carica papaya* L.) seedlings.
Sci. and Cult., 1952, **17**: 477-9, bibl. 4, illus.

Pythium aphanidermatum and *Rhizoctonia solani* were found to be responsible for damping-off in papaw seedlings at Kanpur, the former causing the greater post-emergence loss and the latter being mainly responsible for pre-emergence loss. Among seed dressings tested Ceresan proved most effective in controlling pre-emergence, and Agrosan GN in controlling post-emergence, damping-off; Phygon came second in both cases. Among soil treatments formaldehyde solution and dust and Cheshunt compound gave good results.

Pineapples.

(*See also* 4501c.)

4390. Topper, B. F.
How to grow pineapples.
Ext. Circ. Dep. Agric. Jamaica **49**, 1952, pp. 20, illus.

Information is provided for Jamaican conditions on varieties, choice of sites and soils, land preparation, propagation by suckers, slips, crowns and segmented stems, spacing and planting, weeding, mulching, manuring, fruiting and harvesting, ratooning and the control of pests and diseases.

4391. Brun, J., and Py, C.
Symptômes foliaires de carence en zinc sur l'ananas en Guinée française. **(Leaf symptoms of zinc deficiency in pineapples in French Guinea.)**
Fruits d'Outre Mer, 1952, **7**: 62-4, illus.

Dry season leaf canker of pineapple is reported from many plantations in French Guinea. The most susceptible introduced varieties are the Abacaxi-Sugarloaf and the Cayenne-Baron de Rothschild groups. The canker which occurs on the upper surface of adult leaves shows first as small yellowish spots which enlarge, become brown in the centre and coalesce; complete destruction of the leaf tissue is the final phase. The cause is the plantation practice of applying mineral manures (which do not contain the trace elements). This raises the plants' absorptive powers and thus causes a reduction in the soil's slender reserves of trace elements and a deficiency of them in the plant. Affected plants showed definite improvement after 2 applications of 1·5% Zn_2SO_4, neutralized with lime, at 50 c.c. per plant at the beginning and end of the dry season. It is not yet known whether the canker affects yields.

4392. (Malaya Department of Agriculture.)
Notes on current investigations, October to December 1951. Pineapple.
Malay. agric. J., 1952, **35**: 46.

Parathion gave a good initial kill of the mealy bug *Pseudococcus brevipes* on pineapples growing in nutrient solution. A dust gave the best results, followed by a 0·2% spray and a 0·4% wettable powder. There was no evidence of a systemic effect.

Rubber trees.

(*See also* 4501h, m, 4502s, t, v, 4531.)

4393. Schoofs, M.
Évolution technique de la culture et de la production du caoutchouc au Congo belge. **(The technical evolution of rubber culture and production in the Belgian Congo.)** [French and English.]
Rev. gén. Caoutch., 1951, **28**: 234-40, illus.

Despite problems standing in the way of an extension of the rubber industry in the Belgian Congo, which are discussed, it is estimated that production, about 8,000 tons in 1950, should increase to 25,000-30,000 tons by 1958. During the war up to 9,000 tons a year were produced by tapping wild creepers, notably species of *Landolphia*, *Carpodinus* and *Clitandra*; this form of production has now ceased. [An article with the same title was noted in *H.A.*, 22: 1982g.]

4394. Grogan, F. O.
Rubber production in Papua.
Quart. Rev. agric. Econ., 1950, **3**: 76-9.
Papuan rubber industry.
Ibid., 1951, **4**: 69-72.

The first of these two articles describes the foundation and development of the rubber industry in Papua which

* For Part I see *H.A.*, 21: 4019.

for some years past has produced 1,000 to 1,800 tons of rubber. Plantations occupy about 23,500 acres of which 12,300 are mature, though owing to labour shortage and market uncertainties only about 7,000 acres were tapped in 1948-49. The average annual yield of crude rubber is about 400 lb. per acre. The second article surveys costs of production which average 13·4d. per lb. for total production, 15·2d. per lb. of saleable rubber allowing 12% scrap as of no value, and 14·5d. per lb. on a calculated production of 82% No. 1 grade, 6% No. 2 grade and 12% scrap. [See also next abstract.]

4395. Bureau of Agricultural Economics (Grogan, F. O., and Maiden, A. C. B.).
The Papuan rubber industry.
Bull. Dep. Comm. Agric. Aust. **7**, 1952, pp. 33.

Features considered in a survey made in 1949 of the Papuan rubber industry were production costs and efficiency, the Australian market for Papuan rubber, overseas marketing possibilities and the further development of the industry. Rubber occupies second place to copra among the chief exports of Papua, its value being about £152,000 per annum. Average yield per acre tapped is about 400 lb., but few of the plantations consist of selected high yielding clones. Grading needs improvement to overcome prejudices among Australian manufacturers. [See also abstract 4394 above.]

4396. Anon.
"Properties of natural rubber latex from clonal and seedling trees of *Hevea brasiliensis*". [Dutch.]
Bergcultures, 1952, **21**: 87-91.

A summary and discussion are presented of 2 papers of the above title published by G. A. Kidder in *India Rubber World*, Vol. 124, p. 563 and p. 699. Experiments were carried out at the laboratories of the Firestone Plantations, Liberia, with seedlings and 9 clones, e.g. Avros 49, Avros 50, Avros 152, BD 5, BD 10, Tjir. I, Tjir. 16, PB 186 and Waringiana 4. The effects of season, age of concentrated latex, and plant material on the properties of the latex were investigated. It is concluded that the latex of many clones is less stable than the latex of seedlings, and that in the choice of clones consideration should be given to the stability of the latex.

4397. de Silva, C. A.
A study of yields of old budded rubber at the Rubber Research Institute.
Quart. Circ. Ceylon Rubb. Res. Inst., 1951 (published 1952), **27**: 28-34, bibl. 2.

Girth, test-tapping and commercial yield data are given for the 1926, 1927 and 1928 planting areas studied. Tapping on renewed bark began in 1943 and gave yields of 1,000 lb. or over for poorer and medium yielding budded rubber which has stood up to double 3, 133% intensity tapping introduced in 1942, 1943 and 1944 without adverse effect, especially with regard to brown bast. Results provide strong evidence that with the correct treatment budded rubber can produce economic yields on renewed bark. In June 1951 average girths for the 3 areas (37·54–39·46 in.) compared very favourably with old seedling rubber, and average bark thickness was 7·7–8·28 mm. Conditions laid down for future replanting call for 30-35 years' economic life for budded rubber.

4398. van Schoonneveldt, J. C.
Bewerking der eerste productiegegevens uit een heveaplantdichtheidsproef in pagger-verband op Sumber Wadung. **(Preliminary production data from a planting density trial with hevea grown on the hedge system in Sumber Wadung.)**
Arch. Rubbercult., 1951, **28**: 67-84, illus.

When rubber was planted on the hedge system in rows 16·5 m. apart, a spacing of 1·65 m. in the rows was found most satisfactory from the point of view of growth and production. Although with wider spacing in the rows the girth and bast thickness of the trees was greater, the yield of dry rubber per unit area was lower. The highest yields were obtained from the clones AV 255, LCB 1320, Tjir 16 and PR 107, a fact which shows that these clones, which are recommended for large-scale planting, are also suitable for planting on the hedge system. BD 5, PB 186, AV 188 and Djas 1 yielded less well. Observations are made on the growth of these clones planted on the hedge system. The rubber was interplanted with coffee, and after some years a spacing of 16·5 m. between the rows was found to be too close. A spacing of 20 m., with 1·5 m. in the rows, is suggested as preferable.

4399. Owen, G.
A provisional classification of Malayan soils.
J. Soil Sci., 1951, **2**: 20-41, bibl. 7.

This tentative classification of Malayan soils on the basis of their parent material is by a member of the Rubber Research Institute of Malaya and includes brief references to their potentialities judged chiefly on the growth of rubber trees.

4400. Compagnon, P., and Tixier, P.
Sur une possibilité d'améliorer la production d'*Hevea brasiliensis* par l'apport d'oligo-éléments. **(On the possibility of increasing the production of hevea by means of minor elements.)** [English summaries.]
Rev. gén. Caoutch., 1950, **27**: 525-6, 591-4, 663-5, bibl. 18.

Experiments were carried out in Indo-China using Roach's injection technique to determine whether minor elements are a limiting factor in latex production by trees tapped in the usual way. Injections were made in holes 1 cm. in diameter and 4 cm. deep, the materials being inserted in powdered or tablet form. The most marked responses occurred when injections were made in the tapping panel. Copper sulphate in particular produced a very marked increase in yield of both latex and rubber, though, owing to some dilution of the latex, the increases were not proportional. Nevertheless, over a 4-month period the increase in rubber yield was 50-60%. The normal decline in production with afternoon as compared with morning tapping appeared the less marked in treated than in untreated trees. The Cu content of the latex of trees injected on 23 May ranged during June to August inclusive from 0·24 to 0·80 mg. Cu per 100 g. latex compared with 0·19 to 0·31 mg./100 g. in control trees. Among other salts tested $MnSO_4$ also increased

yields, K_2SO_4 caused a temporary increase followed by a sharp decrease and $ZnSO_4$ caused a distinct decrease. In 2 tests 2,4-D applied to the surface of the tapping panel, which had previously been scraped but without causing latex to flow, increased latex production by 40 and 100% but with marked dilution. It remains to be determined whether the stimulation of production with $CuSO_4$ or other salts will have a deleterious effect on subsequent production, and also whether it will be possible to repeat the treatment when the initial effect has worn off.

4401. TIXIER, P.
Le cuivre et la nutrition d'*Hevea brasiliensis*. **(Copper and the nutrition of hevea.)**
Rev. gén. Caoutch., 1952, **29**: 358, bibl. 2, illus.

A growth response was obtained in hevea seedlings grown in pots at the Institut des Recherches sur le Caoutchouc en Indochine when 5, 50 and 100 mmg. Cu as $CuSO_4$ were added per kg. of a " red earth ", but with a " gray earth " the results were too variable to be significant. The Cu content of mature leaves rose from 0·0010% D.M. in plants in untreated gray earth to 0·0020% D.M. for the 100 mmg. rate of application. In the red earth the comparable figures were 0·0015 and 0·0023% D.M.

4402. TIXIER, P.
The injection of trace elements, especially of copper in the form of sulphate, into the *Hevea brasiliensis* tree.
J. Rubb. Res. Inst. Malaya, 1951, **13**: 192-9, being paper No. 5 of *Commun.* **276**.

The injection of a few g. of $CuSO_4$ into hevea causes an increase in latex production but reduces its rubber content. The increase is very variable and may be about 50% or more over controls. It usually lasts 5-6 months and the increased yields have been maintained by periodical re-injection without any apparent adverse effects on future yields or tree health. There is no correlation between the response of the tree and the amount of $CuSO_4$ used. Sulphates of B, Mg and Fe were not so effective as that of Cu, while that of Zn depressed the yield.

4403. CHAPMAN, G. W.
Plant hormones and yield in *Hevea brasiliensis*.
J. Rubb. Res. Inst. Malaya, 1951, **13**: 167-76, bibl. 5, being paper No. 2 of *Commun.* **276**.

Research on the relationship between plant hormones and yield in *Hevea brasiliensis* began in 1937 following the widespread application of cowdung mixtures to scraped bark by Asian planters to improve bark renewal and increase yield. After the war various selective weed-killers and other plant hormones were tried on bark. 2,4-D proved the most satisfactory of the hormones tested. In one experiment yields (expressed as % of control) varied from 152% for high yielding to 193% for low yielding seedlings and from 129-179% for high-yielding to 157-212% for low-yielding clones. Yield responses varied considerably between different clones on the same estate and the same clone on different estates. Yields reached their maxima within 7-10 days of application, then fell until 6 weeks after application and finally rose to a second peak at the end of about 2 months. Thereafter they fell slowly over a period of months but never seemed to drop below those of the controls. At present it is suggested that treatment should not be more frequent than once in every 4 months and the wintering period should be avoided. A study of the natural hormone in latex suggested that it is produced in response to wounding. The conclusion may be drawn that the synthetic hormones are acting in a similar manner to the natural ones and may be described as supplying a natural deficiency from the point of view of yield.

4404. YOUNG, H. E.
Leaf mildew of rubber—a review.
Quart. Circ. Ceylon Rubb. Res. Inst., 1951 (published 1952), **27**: 3-15, bibl. 107.

The subject is dealt with under the following headings: occurrence and geographical distribution, origin, nature, life history, damage caused, susceptibility, crown budding and breeding for resistance, spread, control by cultural practices and chemicals. Oidium was first identified in Ceylon in 1925 and dieback due to it is now common in some areas; the dead branches are often invaded by the fungus *Botryodiplodia theobromae*, which causes further dieback and sometimes death. Crown budding and breeding with the resistant LCB 870 are taking place. Adequate control is obtainable by sulphur dusting at 10-12 lb. per acre at 7-10 day intervals, begun at budbreak after defoliation and continued until refoliation is complete. Activated sulphur at half the above rate also gives good results.

4405. HEINISCH, K. F., AND VAN DER BIE, G. J.
Dirt content of crude hevea-rubber. I. Determination of dirt content. II. Average dirt content of trade grades. III. Elimination of dirt during preparation. IV. Influence of packing and bale coating. [Indonesian and Dutch summaries.]
Arch. Rubbercult., 1951, **28**: 1-60, bibls. numerous, illus., being *Commun. Found. Indones. Rubb. Res. Inst. Bogor* **84**.

The incidence of contamination on estates and methods of prevention are considered.

4406. VAN GILS, G. E.
Studies on the viscosity of latex. I. (Influence of the dry rubber content.)
Arch. Rubbercult., 1951, **28**: 61-6, bibl. 6, being *Commun. Found. Indones. Rubb. Res. Inst. Bogor* **82**.

The effect of the DRC of latex on the viscosity is discussed. A method is proposed to take this effect into account. A formula is given to calculate the V_R, i.e. the rheological active volume of the dispersed phase divided by the volume as determined by analytical means. It appears that the V_R of ammoniated latex is increased by the presence of lutoid particles which did not dissolve on ammonification. It is shown that clonal and seasonal variations exist. Other factors have not yet been investigated. [Author's summary.]

4407. SIMONART, P.
Bactéries et latex. **(Bacteria and latex.)**
Bull. agric. Congo belge, 1952, **43**: 63-8, bibl. 7.

The results are given of quantitative and qualitative microbiological examinations of hevea latex made at

Yangambi at the time of collection and subsequently. The bacteria found were different from those described from Annam and Malaya, the dominant types being an *Achromobacter* and a bacterium identical, or related, to *Erwinia nimipressuralis*. Certain general considerations on the action of bacteria in latex are discussed.

4408. BARNET, G. W. D.
Mechanical felling of rubber trees.
Adv. Circ. Rubb. Res. Sch. Ceylon **33**, 1952, pp. 6, illus.
Trials showed that 50 acres of old rubber can be uprooted and cleared in 6 months by a gang of 4 operating a Trewhella Monkey Grubber weighing 2 cwt. and using tackle weighing 2½ cwt. An important advantage is that trees usually come up complete with up to 6 ft. of the large laterals in which *Fomes lignosus*, if present, might otherwise remain to infect the new planting.

Sugar cane.

(*See also* 3350h, 4501g, t, w, 4502c, f, i, j, o, p, u, 4521, 4533, 4558.)

4409. GONZÁLEZ-RIVERA, R.
Report on Australia—Hawaii—U.S.A. tour.
Proc. 24th annu. Conf. Asoc. Téc. Azuc. Cuba, 1950, pp. 7-106, illus.
In addition to an account of field and mill practices this report touches on research, education and economic and social aspects, especially in Australia and Hawaii.

4410. VAN DILLEWIJN, C.
Sugarcane in Ceylon.
Trop. Agriculturist, 1951, **107**: 207-17, illus.
The author gives a general account of world production, yields per acre and sugar consumption by countries, and of the requirements of sugar cane and its cultivation, with the object of considering the potentialities and problems that would be associated with the establishment of a sugar industry in Ceylon. Experimental work is already in progress and the Government of Ceylon has decided that a start should be made on a commercial scale.

4411. LONG, B. E.
Progreso en la industria azucarera de Cuba, Florida, Louisiana, Hawaii y México. V. Cultivo de la caña en plantaciones irrigadas en Hawaii. **(Progress in the sugar cane industry of Cuba, Florida, Louisiana, Hawaii and Mexico. V. Irrigated culture in Hawaii.)**
Acta Agron. Palmira, 1952, **2**: 119-25, illus.
The methods used in Hawaii of preparing the soil, and of manuring and mechanical harvesting are reviewed, and the extent to which some of these methods might be used in Colombia is discussed.

4412. BARRETO, R.
Work done by the Sugar Cane Experiment Station [Cuba] in 1950.
Proc. 24th annu. Conf. Asoc. Téc. Azuc. Cuba, 1950, pp. 165-71.
Genetics: Over 18,000 seedlings were raised from 21 crosses which are listed. Selections from seedlings raised between 1946 and 1949 amount to 2,830, some of which are being subjected to mosaic tests. Comparative trials involving 15 varieties have been laid down. *Borer control:* The "Cuban fly", *Lixophaga diatraeae*, is being reared and released in an attempt to control *Diatraea saccharalis*. *General:* It is concluded that, although the work of the Experiment Station has not been as fruitful as could be desired, some progress has been made in 1950 towards making it more adequate for the needs of Cuba's leading industry.

4413. BAVER, L. D.
Research in the Hawaiian sugar industry.
Proc. 1951 Mtg B.W.I. Sugar Tech., British Guiana, pp. 10-15.
The author, who is Director of the Experiment Station of the Hawaiian Sugar Planters' Association, reviews recent sugar cane research in Hawaii with special reference to breeding, methods of preventing arrowing, the use of radioactive carbon to trace the stages of sucrose formation and of radioactive phosphorus in relation to fertilizer placement, foliar applications by air of N and K_2O, studies on foliar diagnosis (not yet completed) and on chemical weed control, and developments in mechanization.

4414. MCMARTIN, A.
The Natal sugar industry—a century of progress.
Fmg S. Afr., 1952, **27**: 203-5.
A brief historical account is given of the growth of the Natal sugar industry since the first sugar cane was introduced in 1847.

4415. RIOLLANO, A.
Present status of research with sugar cane at the Agricultural Experiment Station of the University of Puerto Rico.
Proc. 1951 Mtg B.W.I. Sugar Tech., British Guiana, pp. 115-22.
A concise account is given of the more important research projects being undertaken by the University of Puerto Rico. *Varieties:* The most comprehensive work is the search for new varieties by breeding and introduction. *Fertilizers:* In fertilizer research emphasis has been laid recently on foliar diagnosis, and an arc tangent equation has been worked out for expressing the relation between leaf analysis at 3 months and final yield. Fertilizer trials have shown N to be the major limiting factor, responses to K and P being slight. Varieties have shown differences in their ability to utilize fertilizers at different fertility levels. Trials with minor elements have so far given no marked yield responses. *Light studies:* Three experiments have been established to determine the effects of amount, intensity and time of applying artificial light on the inhibition of arrowing; with the variety M.P.R.28 it has been shown that 2 hr. light of 20 f.c. inhibits arrow development and increases cane and sugar production per acre. *Diseases:* An experiment to determine the effect of common mosaic on the yield of B.34104 is in progress; so far in the plant crop diseased cane yielded 30% less tonnage and 43% less sugar than healthy cane. The effect of chlorotic streak on P.O.J. 2878 is also being determined; so far healthy plant cane has yielded 45% more sugar and first ratoon cane 31% more than diseased cane; treatment of diseased setts with hot

water at 52° C. for 20 min. gave good control, increases in sugar yield over untreated diseased cane amounting to 28% in plants and 35% in ratoons. *Insect pests:* The most serious pest in Puerto Rico, the moth borer (*Diatraea saccharalis*), is being studied. Preliminary trials on the pests coming next in economic importance show that white grub (*Phyllophaga* sp.) can be controlled with dieldrin, BHC, aldrin and chlordane, and "vaquitas" (*Diaprepes* sp.) by dieldrin and aldrin.

4416. RYLE-DAVIS, W.
Report to the President and Executive Committee of the Jamaican Association of Sugar Technologists on a visit to Puerto Rico to attend as J.A.S.T. Representative the Annual Conference of the Puerto Rican Sugar Technologists' Association.
J. Jamaican Ass. Sugar Tech. (*J.A.S.T.*), 1949 [issued 1950?], **13**: 15-21 [received 1952].

Following a brief general account of the sugar industry in Puerto Rico, progress made in the use of herbicides and on cane varieties, fertilizers and irrigation is reported. The section on herbicides includes formulations of salts and esters of 2,4-D used as pre-emergence sprays and of oil emulsions, activated with sodium pentachlorophenate, pentachlorophenol or dinitro compounds, used as contact sprays.

4417. MORIYA, A.
Sugarcanes in the Far East. Some cytogenetical considerations.
J. Hered., 1952, **43**: 101-4, bibl. 14.

Sugar canes best adapted for the Far Eastern subtropics are varieties obtained by crossing tropical varieties of Java (descendants of *Saccharum officinarum* × *S. spontaneum*) and subtropical canes of India (*S. barberi*).

4418. LI, H. W., MA, T. H., AND SHANG, K. C.
Cytological studies of sugarcane and its relatives. IX. Further studies of hybrids of intergeneric and interspecific crosses. [English and Chinese.]
Rep. Taiwan Sugar Exp. Stat., 1951, No. 7, English version pp. 1-14, Chinese version pp. 15-24, bibl. 5, illus.

The studies described were based on progeny from the following crosses: P.O.J.2725 × *Miscanthus japonicus* and the F_1 (seedling 36–771) × P.O.J.2878, 34–1085 × *S. spontaneum* var. *Glagah Tabongo* and 36–424 × *S. spontaneum* subsp. *indicum* vars. *genuium* and *roxburghii*.

4419. LI, H. W., AND SHANG, K. C.
Genetical studies of the interspecific cross, cane varieties and *Saccharum robustum*. [English and Chinese.]
Rep. Taiwan Sugar Exp. Stat., 1951, No. 7, English version pp. 25-36, Chinese version pp. 37-45, bibl. 2, illus.

Hardness, sugar content, stalk colour and node prominence were compared in crosses involving 2 cane varieties Sampang A and F85 with the robustum selection 28NG251 and back crosses of F_1 seedlings with P.O.J.2725. Practical considerations on the use of *S. robustum* as breeding material are discussed.

4420. SHANG, K. C.
Studies on the pollen grain in sugarcane. [Chinese with English summary ⅔ p.]
Rep. Taiwan Sugar Exp. Stat., 1951, No. 7, pp. 55-66, bibl. 3, illus.

There were large variations in different years in the amount of pollen sterility in 48 varieties. Climatic factors had a marked influence on the development of pollen grains. Deep colour and a large opening in the anthers were usually indicative of a high proportion of fertile pollen. Pollen fertility was determined in 8 varieties at different stages of flowering between September and February in 2 seasons; the production of sterile pollen was higher in the first season which had lower average monthly temperatures. Abnormal phenomena in pollen mother cell division among varieties producing sterile pollen are described.

4421. CRAMER, P. J. S.
Sugar-cane breeding in Java.
Econ. Bot., 1952, **6**: 143-50, bibl. 12.

A tenfold increase in the yield of sugar per ha. in Java in the course of a century was obtained partly by general improvement in the growing technique, but mainly by the improvement of planting material. From the outset increase of yield and disease resistance formed an equally important part in the breeding programme. In this work one single plant, Krüger's wild kassoer, an intermediate in its characters between the wild cane of Java, *Saccharum spontaneum*, and the cultivated forms, has proved of exceptional value, and has been used in the production of all superior clones introduced since 1927.

4422. DE SORNAY, A.
Cane breeding in Mauritius. Some aspects of the current work.
Proc. 26th annu. Congr. S. Afr. Sugar Tech. Ass., 1952, reprinted in *S. Afr. Sugar J.*, 1952, **36**: 149-55.

Among the points mentioned in this survey of cane breeding work in Mauritius are: It has been found that certain varieties, e.g. M.63/39, vary in their degree of ♂ fertility in the course of the arrowing season as well as from year to year. There are marked differences in sexual compatibility between ♂ and ♀ parent varieties. Attempts to induce arrowing in non-flowering varieties by photoperiodism, geotropic stimulation, high P_2O_5 dressings, waterlogging and stem and leaf injections with juice from cane bearing rudimentary inflorescences have been unsuccessful; in 1952 experiments will be made with auxin-antagonistic compounds. An early indication that varieties of the fourth-nobilized *Saccharum spontaneum* type would prove most suitable in Mauritius have been substantially confirmed. P.O.J.2878 has been an outstanding ♀ parent; in combination with D.109 it produced M.134/32 now occupying over 95% of the cane area. The very vigorous Uba Marot has also proved of interest and has produced the exceptional seedling Ebene 1/37. The paper concludes with an account of the present breeding policy, crossing technique, field planting of seedlings, seedling selection and selection of canes, especially from first ratoons.

4423. ANON.
Varietal trials—1951 season.
Cane Grs' quart. Bull., 1952, **15**: 113-27.

Yields of cane and sugar are given for 21 trials harvested during 1951. Among the large number of varieties included the only really noteworthy performances were those of Q.50 in parts of north Queensland and of N.Co.310 in parts of the south. The latter also proved relatively frost resistant.

4424. Fors, A. L.
Description of new sugar cane varieties in Cuba. Part I.
Proc. 24th annu. Conf. Asoc. Téc. Azuc. Cuba, 1950, pp. 129-35, illus.
Descriptions are given of the growth characters of 4 varieties from the Rio Piedras Experiment Station in Puerto Rico, PR's 902, 905, 908 and 911. Apart from PR 908, which is promising, preliminary trials in Cuba have given disappointing results.

4425. Morales Hernández, J.
A study of the "Pepe Cuca" or "San Agustin" sugar cane variety.
Proc. 24th annu. Conf. Asoc. Téc. Azuc. Cuba, 1950, pp. 137-45.
This variety, of uncertain origin, was introduced into the San Agustin area of Cuba in 1940 and has since been widely planted under the names of Pepe Cuca, Media Luna Co.213 or San Agustin Co.13. It is a thin stalked cane with good field and milling qualities and is well suited to medium or poor soils.

4426. Anon.
New cane varieties. 1952 distribution from Experiment Station.
S. Afr. Sugar J., 1952, **36**: 181.
Descriptions are given N:Co.339, N:Co.293 and N:Co.291, all of which were derived from Co.421 × Co.312.—Exp. Stat. Mt. Edgecombe.

4427. Shih, S. C.
Studies on the variations of some important characters between the first and second year seedlings of sugarcane. [Chinese with English summary 1 p.]
Rep. Taiwan Sugar Exp. Stat., 1951, No. 7, pp. 67-74, bibl. 3.
Comparisons were made between a large number of seedling canes and plant canes raised from setts taken from the seedlings the following year. The vegetatively propagated plant canes produced fewer stalks and had lower brix but greater average height and size of stalk and showed a higher percentage of arrowing than the seedlings. Differences in brix and stalk size were not significant, and it is concluded that these characters are comparatively stable, whereas the other characters—number of stalks per stool, height of plants and percentage of arrowing—showed such wide differences, due probably to change in climate and soil between the two years, as not to be reliable.

4428. Lal, K. N., and Mehrotra, O. N.
Studies in crop physiology. On some physiological attributes of transpiring surface in relation to drought resistance in sugarcane.
Proc. Indian Acad. Sci., Sect. B, 1950, **32**: 179-204, bibl. 41 [received 1952].
Investigations were made at the Benares Hindu University on the effect of certain factors upon the development of leaves in 12 varieties of sugar cane. Studies were made on mother shoots 9 months old, tillers of pre-monsoon origin 6-8 months old, tillers of monsoon origin 3-6 months old and tillers of post-monsoon origin 1-3 months old. Leaf attributes such as length, width, area and dry matter differed significantly with varieties, age of tillers and developmental stage of the foliage. In general, values were highest in pre-monsoon shoots and lowest in post-monsoon. High values were shown by Co.453 and Co.290, medium by Co.299, Co.421, Co.385, Co.213 and Co.312, and low by Co.313, Co.356, Cos.76, Co.205 and Rheora. The low values shown in the third group may be indicative of drought resistance, because of these varieties Rheora, which showed the lowest values, is known to be drought resistant. With most varieties these values increased with leaf age up to a certain stage, but moisture contents showed little change and hence declined relative to the other factors. The poor development of leaf surface in post-monsoon tillers may perhaps be due to greater competition for water and nutrients and lower light intensity and temperatures during their development.

4429. Lal, K. N., and Mehrotra, O. N.
Studies in crop physiology. Interrelation between leaf area, leaf indices and drought resistance in sugarcane.
Proc. Indian Acad. Sci., Sect. B, 1950, **32**: 252-68, bibl. 40 [received 1952].
Studies on 6 varieties of sugar cane show that a high positive correlation exists between leaf area and the measurements length, breadth and dry weight. In two varieties there was a significant negative correlation between leaf area and moisture content. The relationship between leaf area and the linear measurements of length and breadth can be expressed by logarithmic equations for both single leaves and a population of leaves. The ratio between actual leaf area and length multiplied by breadth ranged from 0·659 to 0·730 and appeared to be constant for any one variety. It was relatively low in drought-resistant Rheora and in Co.205, and relatively high in the other 4 varieties.

4430. Srivastava, R. K.
Wilt roll in grasses. I. Involution *Saccharum spontaneum* L.
Sci. and Cult., 1952, **17**: 529-30, bibl. 2, illus.
A comparison is made between cell behaviour in mature leaf-blades of *S. spontaneum* that were unwilted, wilted naturally on the plants, and air-dried at room temperature for 24 hr.

4431. Vijayasaradhy, M.
Raw-rice washings—a source for cane growth factors.
Curr. Sci., 1952, **21**: 50, bibl. 3.
The daily application of rice washings to 7 weak-growing sugar cane varieties grown in sand culture with buffered Knop's solution supplied once a fortnight resulted in a marked increase in growth over 3 months.

4432. Khanna, K. L., and Bandyopadhyay, K. S.
Sampling studies in sugarcane. IV. The estimation of fibre content.
Proc. Indian Acad. Sci., Sect. B, 1950, **32**: 269-88, bibl. 9, illus. [received 1952].

In sampling studies on 3 varieties it was found that the mean fibre content in January was significantly lower than in March. Fibre was lowest in Co.313, intermediate in Co.356 and highest in Co.299. The largest variation occurred between samples of individual stalks owing to differences in age, and sampling for fibre should be based on whole stools. In $\frac{1}{10}$th acre plots containing 6 rows an error margin of 5% was obtained from samples of 1 to 2 stools per row and an error margin of $2\frac{1}{2}$% from samples of 2 to 14 stools per row.

4433. WIGGINS, L. F.
A survey of the work of the British West Indies Sugar Research Scheme.
Proc. 1951 Mtg B.W.I. Sugar Tech., British Guiana, pp. 16-25, bibl. 14.

The B.W.I. Sugar Research Scheme was inaugurated in September 1947, its main functions being to study the technology of sugar manufacture, methods of utilizing by-products and some fundamental chemical and biochemical aspects of the sugar cane. Agricultural aspects of the sugar industry, which were held to be covered adequately by existing organizations, were excluded from the scope of the scheme. The present survey of work so far undertaken includes an account of determinations, by paper partition chromatography, of amino acids [see next abstract], carboxylic acids and sugars in cane juice. Amongst the acidic constituents it was possible to identify glucose-1-phosphate, and it is considered highly probable that the sucrose in the plant is produced from this substance. The presence of 2-ketogluconic acid in juice expressed from freshly cut cane is thought to be due to a micro-organism, probably of the *Acetobacter* type, inside the cane itself. Studies on sugar cane wax have indicated the existence of marked differences in yield between colonies (yields are highest in the northern Islands) and between varieties.

4434. WIGGINS, L. F., AND WILLIAMS, J. H.
The constituents of cane juice. Part II. The quantitative examination of the amino acids of cane juice.
Proc. 1951 Mtg B.W.I. Sugar Tech., British Guiana, pp. 40-9, bibl. 3, illus.

In an earlier paper [*H.A.*, 21: 1130] an account was given of the identification, by two dimensional paper partition chromatography, of 11 amino acids in the juice of B.34,104. In the present paper the technique used to estimate the amounts of the principle amino acids present is described. It is based on the use of one dimensional strip chromatograms and a modification of the analytical procedure developed by Woiwod.* Three studies are reported. (1) Comparison between juices from the top portion of canes of immature B.41,211 analysed after a delay of 14 days and ripe B.37,161 analysed immediately after cutting showed that although the overall picture was similar there were marked differences; the concentration of alanine was similar in both, but in the latter glycine and asparagine had appeared at the expense of aspartic and glutamic acids. (2) Comparison between juices from the top portion of canes of 12 varieties showed marked differences in the total amino acid concentration in a range from 0·9 millimoles/l. juice in B.37,172 to 12·5 millimoles/l. in B.29,35. The general amino acid picture was similar for every variety, but, whereas asparagine is regularly found in juices from freshly cut canes examined in Trinidad, both asparagine and glycine were absent in all these samples which had been analysed after the delay necessitated by their air-transport to England. It is thought that asparagine may have decomposed to aspartic acid, but that glycine would not be expected to decompose. (3) Analyses in Trinidad of the amino acid content of different sections of freshly cut stalks of plant canes of B.37,161 at 9, 10, 11 and 13 months showed that at all stages the highest content was present in the top portion of the cane, the concentration falling to a minimum in the centre and rising again towards the bottom. As the cane approached maturity the content declined in all sections.

* Woiwod, A. J. *Biochem, J.*, 1949, **45**: 412.

4435. HUMPHRY, E. V.
The circular saw for cutting plants.
Cane Grs' quart. Bull., 1952, **15**: 95-9, illus.

Descriptions are given of several methods evolved by growers of cutting cane setts with circular saws. The cut setts are either collected in containers used for dipping or fall direct into a dipping tank below, from which they are transferred to a lorry on a conveyer belt.

4436. GRAFF, N. G.
The stick planting method.
Cane Grs' quart. Bull., 1952, **15**: 137-9, illus.

Hand planting is still the common practice in the wet belt of Queensland. The cane stalks are laid along the furrows and cut into setts *in situ*, being subsequently covered and fertilized in one or two operations. Planting can proceed under conditions that are too moist for a cutter planter to operate, and germination is good. On moist soil types it has been noted that, contrary to expectation, the furrows compacted by the tractor and trailer conveying the stalks through the field produce the quickest and densest germination.

4437. CERICE, R. B.
A convenient method of mapping cane plantations and mnemonic code.
Proc. 24th annu. Conf. Asoc. Téc. Azuc. Cuba, 1950, pp. 195-202, illus.

By the method described it is possible to record on maps, field numbers and areas, and, by using mnemonic signs, data concerning the cane variety and its condition (whether plant, ratoon, etc.), manuring and drainage.

4438. SUN, V. G., AND SZE, W. B.
The effect of interplanting various crops upon the growth and yield of the early planting sugarcane. [Chinese with English summary 2 pp.]
Rep. Taiwan Sugar Exp. Stat., 1951, No. 7, pp. 82-123, bibl. 9.

Interplanting cotton in every row or every second row did not reduce the total yield of sugar from plant canes where heavy supplementary dressings of NPK were applied, whereas in a previous experiment interplanting cotton without extra manuring reduced cane yields appreciably. Interplanting flax, sweet potatoes and tomatoes caused marked reductions in cane yields. Interplanting soya beans and turning them under as a green manure crop increased cane yields significantly. Interplanting 2 rows of peanuts in the cane inter-rows,

harvesting the crop and using the vines as a green manure did not appear to have any detrimental effect on the cane.

4439. Laurie, J. E.
A modified form of "Louisiana banking" of canes as practised on the farms of the Jamaica Sugar Estates Limited, in the parish of St. Thomas, Jamaica.
Proc. 1951 Mtg B.W.I. Sugar Tech., British Guiana, pp. 183-5.

With an average rainfall of 80 to 100 in. cane grew well on alluvial flat lands but was difficult to ripen despite good drainage. Experience over the past 8 years has shown that marked increases in sugar yields followed the banking of both plant and ratoon canes. The machines used in the operation and the various other benefits accruing from it are indicated.

4440. Smith, N. M.
Velvet beans in Maryborough and Moreton areas.
Cane Grs' quart. Bull., 1952, **15**: 139-40, illus.

From trials in the Maryborough and Moreton areas of velvet beans as a green manure crop preceding cane it is concluded that Somerset is the heaviest yielding variety. About 15 tons green matter are produced per acre, yielding N equivalent to about 750 lb. sulphate of ammonia. Seed is best sown from September to November at a rate of 12 lb. per acre in rows 4 ft. 6 in. apart, and 2 cultivations are generally needed. If broadcast the seed rate is about 40 lb. per acre and the addition of 20 lb. of Poona pea seed is suggested to give a quick early cover.

4441. Bonnet, J. A., Abruña, F., and Lugo López, M. A.
Trash disposal and its relation to cane yield, soil and water losses.
J. Agric. Univ. Puerto Rico, 1950 (issued 1951), **34**: 286-93, bibl. 3, illus.

The effects of leaving the trash as a mulch or of burning it were compared between 1944 and 1948 in Puerto Rico for 4 crops on a 40% slope. Cane and sugar yields and water losses showed no significant differences. Soil loss was about 11 times greater from the unmulched plots.

4442. Halais, P.
Méthodes d'analyses de terres élaborées au Queensland pour servir de guide à l'emploi rationnel des engrais en culture de la canne à sucre. **(Methods of soil analysis evolved in Queensland as a guide to controlled manuring in sugar cane cultivation.)**
Rev. agric. Maurice, 1952, **31**: 5-16, bibl. 8, illus.

The methods of soil analysis used in the framing of the standard manuring schedule employed in the Queensland sugar cane districts are described. After standardization of field and laboratory technique and exhaustive experimentation Ca, P, K, N and PK schedules embodying dosage and season of application were drawn up for the different soils. The analytical methods and their interpretation are applicable to certain soils in other sugar cane countries.

4443. Vallance, L. G.
Soil fertility investigations. Results of the 1951 season.
Cane Grs' quart. Bull., 1952, **15**: 128-33.

Results obtained in 6 NPK trials are summarized. In general there were responses to sulphate of ammonia, and in several cases to potash also. Much of the land had received generous applications of P in the past and responses to this element were slight or nil. In one trial, on a red schist, sandy loam in which the increased monetary returns for a range of fertilizer combinations are tabulated, by far the best return—£88 per acre over 3 crops—was obtained from an annual dressing of 420 lb. sulphate of ammonia, 210 lb. superphosphate and 150 lb. muriate of potash. Out of 17 trials, in which lime was applied at up to 2 tons per acre, 14 showed a higher yield from liming, but, as yield differences were small and in some cases insignificant, this result can only be regarded as indicating a trend.

4444. Robinson, J. B. D.
A brief review of sugar-cane manuring in Barbados.
Proc. 1951 Mtg B.W.I. Sugar Tech., British Guiana, pp. 73-7, bibl. 22.

Investigations made since 1928 on the manuring of sugar cane in Barbados are concisely reviewed. Direct responses to manuring are primarily governed by the amount and distribution of rainfall rather than by the rate of application. Recommendations based on the results of these investigations include the general use of N and K but not of P, the application of sour grass (*Andropogon* spp.) and cane top mulches to plant canes at the end of the wet season (December), and the use, where possible, of 10-15 tons pen manure per acre with reduced K dressings. In black rendzina type soils cane may show a chlorosis in the early growth stages that resembles lime-indiced chlorosis observed in Antigua; in one instance completely chlorotic cane responded slightly to injections of ferrous sulphate.

4445. Knowles, W. H. C.
A brief review of sugar cane manuring in British Guiana.
Proc. 1951 Mtg B.W.I. Sugar Tech., British Guiana, pp. 92-6, bibl. 10.

Sugar cane in British Guiana is grown on 3 main soil types, front land clays, riverside clays, and pegassy clays developed from typical tropical peat soils. All 3 soils require N, though the amount needed is less following flood fallowing. Although P contents as determined by Truog values are sometimes very low, there have been few responses to P applied in various forms except in a few pegassy soils. Occasional responses to K and Ca have occurred but only on pegassy soils. Applications of Mn on pegassy clays have had no clear effect. Maize microplots have not given reliable indications of cane fertilizer requirements.

4446. Hardy, F., and Rodrigues, G.
The nitrogen enigma of the sugar cane soils of British Guiana.
Proc. 1951 Mtg B.W.I. Sugar Tech., British Guiana, pp. 97-102, bibl. 6.

The nitrogen enigma referred to is defined as a conspicuous "shortage of N in the midst of plenty".

Large amounts of ammoniacal-N apparently occur in soils that respond to ammonium sulphate fertilizer Suggestions are made for investigating the problem.

4447. Sánchez, P. A.
A study on fertilization of sugar cane lands.
Proc. 24th annu. Conf. Asoc. Téc. Azuc. Cuba, 1950, pp. 107-28, bibl. 3.

Data are presented from a series of experiments on P.O.J.2878 growing mainly on Matanzas clay soil. In one series applications of 4, 5 and 6 short tons natural Chilean nitrate containing 10% K_2O per caballería (13·42 ha.) gave marked increases in yields of cane and sugar over no fertilizer, but the increase from the 6-ton over the 5-ton application was not economic. In a second series both 7% and 10% potassic Chilean nitrate and 10–8–3 fertilizer gave increased yields over controls and in most cases the nitrates gave better results than the mixed fertilizer. In a third series the addition of 46% superphosphate to potassic nitrates increased yields as compared with nitrates alone or 10–8–3 fertilizer; all treatments gave much greater yields than unmanured controls. Increased profits resulting from the use of nitrates with and without added P_2O_5 are indicated.

4448. Dutt, N. L., and Aiyar, K. V. G.
Fertilizers and cane production.
Symposium "Chemicals for Agriculture", Poona, reprinted in *S. Afr. Sugar J.*, 1952, **36**: 173-9, bibl. 11.

From the investigations reviewed here it is concluded that the low average yield of sugar cane in India is largely attributable to lack of nitrogen. The optimum dose varies from under 100 lb. N per acre in Bihar to about 425 lb. in Bombay. Although organic manures have generally given smaller responses than inorganic N their value for improving soil fertility has been demonstrated. There have been few yield responses to P_2O_5 and K_2O, but in nearly all cases P_2O_5 has improved quality.

4449. Pimentel Gomez, F.
A adubação da cana de açúcar, em Pernambuco, determinada pela lei de Mitscherlich. **(Manuring of sugar cane in Pernambuco based on Mitscherlich's law.)**
Rev. Agric. Piracicaba, 1951, **26**: 357-64, bibl. 4.

The calculations presented show that the most suitable amount of fertilizer is 58 kg. P_2O_5 and 30 kg. K_2O per ha., N being unnecessary.

4450. Smith, A. M.
Sugar cane fertilizer experiments and recommendations in the Victorias milling district, Philippines.
J. Soil Sci. Soc. Philipp., 1951, **3**: 258-62, from abstr. in *Soils and Ferts*, 1952, **15**, No. 1128.

It is suggested that maturity of sugar cane on soils deficient in available Ca, P and K may be hastened by applying N and P in a ratio of 1 : 1¼ and by proceeding carefully with K dressing. Use of 16–20–0 and of KCl is recommended at rates of 100 kg./ha. of N, 125 kg. of P_2O_5 and 75 kg. of K_2O.

4451. Hanschell, D. M.
Manurial trials with sugar cane in Trinidad.
Proc. 1951 Mtg B.W.I. Sugar Tech., British Guiana, pp. 78-91, bibl. 22.

The results of fertilizer trials made during the past 20 years are summarized. The soil survey and mapping of the whole sugar area has been completed and it has been possible to relate the main fertilizer responses to the various soil types. All Trinidad sugar cane soils respond to N, the lighter soils but less often the clays respond to K, but responses to P, especially on soils of the Northern Basin, have been variable and need further investigation. Responses to Ca have occurred on 3 soil types and on 2 of these significant interactions have been recorded between ground limestone and N, P, K and pen manure. Only in a few trials have significant interactions been found between N, P and K.

4452. Innes, R. F., and Chinloy, T.
The effects of fertilizers on sugar cane. I. Potash.
Proc. 1951 Mtg B.W.I. Sugar Tech., British Guiana, pp. 56-72, bibl. 13.

Under Jamaican conditions it has been shown that the final molasses contains an average of 2·73% K, representing the removal of 37 lb. muriate of potash with each 10 tons of cane harvested. The drain of K is greatest in cane reaped at the beginning of the crop. *The effect of potash on cane yield and quality:* A re-examination was made of all the experimental data available, from 257 experiment crops, on the effect of potassic fertilizers on cane in Jamaica. These data indicate: (1) Soil type exerts a dominant influence on the magnitude of the relative response, K being particularly important on soils derived from Inland Basin alluvia. (2) The degree of relative response is not influenced by rainfall. (3) K interactions with N or P are of no practical importance. (4) On K deficient soils the application of K improves juice quality as well as cane yield. (5) The Mitscherlich relationship between applied K and yield was examined for trials using three or more levels of K, and, though the "effect factor" C was found not to be a constant, a useful working relationship was established. *Foliar analysis as a means of diagnosing expected yield responses to applied potash:* Analytical data were examined which were based on leaf blade tissue of the third fully opened leaf counting downwards, and the K concentration expressed as K_2O% of the dry matter, which is termed the Potash Index. It was found that: (1) The potash index is a positive function of available soil K, the relation being approximately linear. (2) The relative increase in potash index resulting from making a constant K application is an inverse function in the index, the two being related hyperbolically. (3) The relative increase in yield as a result of making a constant K application is an inverse hyperbolic function of potash index. (4) The relative increase in yield was a linear function of relative increase in potash index. (5) The relationship between the potash index or relative yield response to a standard dressing of K, the cost of potash, the value of cane, and the average level of expected yield can be set out in a nomogram in such a way that the optimum economic application of potash can be determined for any given set of conditions.

4453. Fuhriman, D. K., and Smith, R. M.
Conservation and consumptive use of water with sugar cane under irrigation in the south coastal area of Puerto Rico.
J. Agric. Univ. Puerto Rico, 1951, **35**: 1-47, bibl. 19 [received 1952].

Sugar cane is grown on 95% of the irrigated land in Puerto Rico and the available water supply is limited and costly. The results of detailed field experiments and lysimeter tank studies have led to the following conclusions: (1) prevailing furrow irrigation methods can be reasonably efficient (50% of the water retained) if the systems are carefully laid out and efficiently operated, whereas properly designed sprinkler irrigation shows 75% efficiency; (2) major changes in irrigation methods, other than sprinkling, would involve fundamental alterations in lay-out and technique which may not be feasible; (3) the periods of greatest opportunity for saving water are the first few and the last few months of the crop season (consumptive use of water 0·1–0·12 in. per day) and the greatest danger of damage because of lack of water normally comes at the season of plant growth (consumptive use 0·18 in. per day) which corresponds with the highest average temperatures; (4) it appears possible to increase cane yields and save water and labour by using soil moisture guides to determine when to irrigate, and both tensiometers and resistance blocks are giving satisfactory results; (5) present field results indicate that high cane yields per acre probably mean less water per unit of crop produced; and (6) under Puerto Rican conditions crop characters and soil moisture levels probably have a greater influence than the weather on evapotranspiration.

4454. Rose, R. D.
Some preliminary observations from field control trials.
J. Jamaican Ass. Sugar Tech. (*J.A.S.T.*), 1949 [issued 1950?], **13**: 1-12, bibl. 3 [received 1952].

The preliminary results of investigations started in 1949 on irrigated cane at Bernard Lodge and Caymanas Estates, Jamaica, indicated the value of: (1) checking the use of water by measuring the acre-inch applications; (2) the application of growth measurements to irrigation control; (3) the use of sheath moisture determinations as a check on the efficiency of control of irrigation and harvesting; and (4) the use of the Clements' Crop Log as a guide to irrigation and ripening control. In addition relationships were established between moisture and maturity and between N and TC/TS, the latter showing the detrimental effect of excessive N applications. [For an account of more recent work see *H.A.*, 22: 3123.] The procedures for crop-logging sugar cane crops as described by H. F. Clements are given in an appendix.

4455. Rodríguez Cabrera, M.
Sunlight and flowering.
Proc. 24th annu. Conf. Asoc. Téc. Azuc. Cuba, 1950, pp. 173-8, illus.

Observations made on the effect of direct light on flowering in cane are described. In one case sections of a field of P.O.J.2878 exposed to floodlights from an adjoining field failed to arrow. In other cases cane of the same variety and of Badila shaded for part of the day by trees or by hillsides arrowed, whereas unshaded cane in the same area did not. It is suggested that an attempt be made to induce and control the time of arrowing by erecting wooden screens to the east and west of cane plants in which arrowing is desired for breeding purposes.

4456. Beauchamp, C. E.
Review of experiments conducted to increase the sugar content of sugar cane by means of hormones.
Proc. 24th annu. Conf. Asoc. Téc. Azuc. Cuba, 1950, pp. 147-64, bibl. 2.

A series of trials is described in which 2,4-D dusts and sprays were applied by helicopter and other means to cane from 10 days to about 3 weeks before harvesting. The results indicate that under suitable conditions small doses of 2,4-D, amounting to 0·5 to 1·0 oz. or less actual 2,4-D per acre, may increase the sugar content at harvest. For the treatment to be effective the cane must be in a vigorous condition. If it is too mature or affected by drought or if the dose of 2,4-D is too high, e.g. over 20 oz. per acre, the treatment may have no effect or may actually reduce sugar yields. It is suggested that the negative results obtained by Loustalot *et al.* [see *H.A.*, 21: 2088] could be explained by their use of too high a dosage of 2,4-D on cane that was very ripe. [For earlier work see *H.A.*, 21: 2087 and 22: 3126.]

4457. Skinner, S. O.
A simple machine for pushing cane breaks.
Cane Grs' quart. Bull., 1952, **15**: 100-2, illus.

For use in making fire breaks preparatory to burning, the equipment described consists of an attachment for parting the cane fitted in front of a tractor and a DH22 Howard Rotary hoe with a 3 ft. cut operated behind the tractor. Up to 20 chains of break can be made in 5 to 7 mins.

4458. Bourne, B. A.
The control of sugar cane mosaic disease.
J. Jamaican Ass. Sugar Tech. (*J.A.S.T.*), 1949 [issued 1950?], **13**: 65-71, bibl. 12 [received 1952].

Work on sugar cane mosaic is reviewed with particular reference to the control of the disease in the Florida Everglades. Among some 10 strains of mosaic recorded in the U.S.A., only strain B has so far been found in Florida. Among vectors of mosaic only *Aphis maidis* has so far been found in the Everglades region. Among commercial varieties in the area 8 are immune, and 5 highly resistant, to strain B. All of these are trispecies combining the blood of *Saccharum officinarum*, *S. barberi* and *S. spontaneum*; their use has resulted in excellent commercial control of mosaic for the past 11 years.

4459. Azab, Y. E., and Chilton, S. J. P.
Transmission of mosaic resistance to progenies in crosses between certain sugarcane varieties.
From abstr. in *Phytopathology*, 1952, 42: 282.

In studies on inheritance of resistance to sugar cane mosaic virus, 71,769 seedlings, grown from true seeds from 175 crosses between different sugar cane varieties, were inoculated in the greenhouse with juice from an

infected variety. The percentages of plants showing mosaic symptoms in the progeny of crosses involving resistant × resistant, susceptible × susceptible, and resistant × susceptible, ranged from 0·0 to 87·7, 2·6 to 35·6, and 0·8 to 94·5% respectively. From the data obtained the hypothesis is advanced that inheritance of resistance to mosaic disease of sugar cane is conditioned by complementary factors, resistance being dominant.

4460. MUNGOMERY, R. W.
Maryborough-Bauple district quarantine against chlorotic streak disease.
SMITH, N. M.
Streak in the Maryborough area.
Cane Grs' quart. Bull., 1952, **15**: 89-90, and 90-2.

The second article describes the symptoms of the disease and refers to field trials in which the use of diseased planting material was shown to depress yields by up to 40%; in low-lying areas losses may be much greater. The first article refers to measures, backed by legislation, that are designed to eradicate the disease which has now been recorded on 55 farms in the area. These measures are: (1) the use of relatively resistant varieties; none is immune; (2) the use of clean setts; (3) the immersion of setts for 20 min. in water at 52° C. in cases where any doubt exists as to the healthiness of planting material; and (4) the compulsory ploughing out of all diseased fields after the second ratoon crop.

4461. WISMER, C. A.
Controlling pineapple disease of sugar cane.
Hawaii. Plant. Rec., 1951, **54**: 23-53, bibl. 75, illus.

Following a review of the literature on the pineapple disease of sugar cane caused by *Ceratostomella paradoxa*, which is the principal cause of rotting of setts in Hawaii, a detailed account is given of laboratory and field trials on fungicidal control measures. The thread technique of Forsberg and a soil-sand-cornmeal inoculum technique proved satisfactory methods for the evaluation of fungicides and gave good correlations with field tests in which setts inoculated with the pathogen were used. Field tests using non-inoculated setts were generally unsatisfactory. Among a large number of fungicides tested the best control was given by pyridylmercuric acetate, pyridylmercuric chloride, and phenyl mercuric acetate (PMA), the last being the least expensive. Excellent control was obtained with 1 qt. PMA per 100 gal. water used for dipping or for spraying or with ½ pt. PMA to 100 gal. water when added to the hot water treatment (HWT, 50° C. for 30 min. or 52° C. for 20 min.). PMA alone gave better protection than HWT alone or than HWT followed by PMA. Varieties responded differently to HWT, the germination of 37–1933 being improved by it, but no response being given by 38–2915. It is recommended that the PMA treatment should be used whenever setts are planted under unfavourable conditions, especially in dry or very wet soils and when temperatures are low.

4462. STORY, C. G.
Pineapple disease in the Mackay district.
Cane Grs' quart. Bull., 1952, **15**: 92-5, illus.

Includes notes on methods evolved by growers of dipping setts in Aretan, used at a rate of 1 lb. in 20 gal. water, to control pineapple disease [*Ceratostomella paradoxa*]. A trial to compare dipping with spraying is in progress.

4463. MUNTAÑOLA, M.
Relaciones antagonicas entre "*Bacillus subtilis*" (Cohn emend. Prazmowsky) y "*Helminthosporium sacchari*" (van Breda de Haan) Butler. **(An antagonistic relationship between *Bacillus subtilis* and *Helminthosporium sacchari*.)** [German summary ½ p.]
Lilloa, 1950, **23**: 319-30, bibl. 26, illus. [received 1952].

In laboratory trials *Bacillus subtilis* was found to have an inhibiting effect on the development of cultures of *Helminthosporium sacchari*, the causal agent of eye spot of sugar cane. The potential value of this antagonism for control purposes is pointed out.

4464. AZAB, Y. E., AND CHILTON, S. J. P.
Studies on inheritance of resistance to red rot disease of sugarcane.
From abstr. in *Phytopathology*, 1952, **42**: 282.

The reaction of progenies of 14 crosses of sugar cane to the red rot fungus, *Physalospora tucumanensis*, was studied by inoculating the stalks, burying them for 2 to 3 months, then digging them up and examining them. From the results the hypothesis is advanced that resistance in sugarcane to red rot is governed by one or a few genes for resistance from *Saccharum spontaneum* plus a dominant inhibitor gene from *S. officinarum*. The inhibitor gene from *S. officinarum* masks the effect of genes for resistance from *S. spontaneum*.

4465. BOX, H. E.
Campaña contra los barrenos de la caña de azúcar (*Diatraea* spp.) en la América tropical. **(The campaign for the control of the sugar cane borer in tropical America.)**
Turrialba, 1952, **2**: 6-8, bibl. 1, illus.

The desirability of using biological rather than chemical means for controlling the sugar cane borers (*Diatraea* spp.) is indicated, and the success that has already been achieved with the parasites *Lixophaga diatraeae* and *Metagonistylum minense* is reviewed. Other insects which should be tested for biological control are *Leskiopalpus diadema* and *Jaynesleskia* sp.

4466. POTTER, T. E. K.
The sugar cane froghopper.
Plant Prot. Overs. Rev., 1951, **2**: 1: 4-9, bibl. 8.

Notes are given on the sugar cane froghopper, *Aeneolamia varia saccharina* (formerly *Tomaspis saccharina*), its life history, and its control by the application of 4-5% BHC dust at 1-2 cwt. per acre to the first brood nymphs.

4467. GUPTA, B. D., AND AVASTHI, P. N.
Use of DDT and benzene hexachloride towards the control of sugar-cane leaf-hopper (*Pyrilla* spp.) in Uttar Pradesh.
Plant. Prot. Overs. Rev., 1952, **3**: 1: 4-12, bibl. 7.

From a review of work on the control of *Pyrilla* spp. with DDT and BHC in Uttar Pradesh, it is concluded

that: (1) one part of 16% DDT emulsion with 50 parts of water and 2 lb. of 50% DDT wettable powder in 50 gal. of water destroy nymphs and adults in 10 to 15 days; (2) 5% BHC having 0·65% active ingredient causes heavy mortality of nymphs and adults at 35-50 lb. per acre during the pre-monsoon, and 50-60 lb. per acre during the post-monsoon, period; (3) death occurs 72 hours after spraying with DDT and 10-12 hours after BHC; (4) both chemicals remain effective for quite a long period as reinfestation was not observed in the treated plots; (5) the actual quantities of DDT required to eliminate *Pyrilla* amount to 0·32% in the 16% emulsion and 0·2% in the 50% DDT wettable powder; (6) there is scope for further dilution of the 16% DDT emulsion to 0·2%, i.e. one part of emulsion in 80 parts of water; (7) 25-50 gal. of spray are required to cover the foliage thoroughly during April-June and 100-200 gal. during October-November, depending on the density of the crop.

4468. Chen, M. T.
An observation on the relationship between some leaf characters of sugar cane and the degree of infection of sugar-cane woolly aphis. [Chinese with English summary ½ p.]
Rep. Taiwan Sugar Exp. Stat., 1951, No. 7, pp. 75-81, bibl. 4.

Studies on cane seedlings showed that there is no relationship between number of hairs, either 1- or 2-celled, or stomata or size of leaf blade and the degree of infection by woolly aphis. However, there was a clear indication that varieties with a relatively large number of fine vascular bundles and with thin and soft leaf blades are particularly subject to attack by woolly aphis.

4469. McDougall, W. A.
Rat populations in canefields during the spring of 1948.
Qd J. agric. Sci., 1950, **7**: 43-7, bibl. 4 [omitted in error from *H.A.*, Vol. 21.]

Seasonal movements of rat population were observed and pregnancy records made. The data revealed a transient type of population consisting of small concentrations of survivors. Weight-age curves of *Melomys littoralis* drawn from data secured between 1937 and 1948 are presented. [Author's summary.]

4470. Doty, R. E.
Warfarin (compound 42), a promising new rodenticide for cane fields.
Hawaii. Plant. Rec., 1951, **54**: 1-21, bibl. 6, illus.

Preliminary results obtained with warfarin (Compound 42) in both field and cage tests have been so promising that extensive trials on a plantation scale are recommended. As rats readily eat warfarin-treated rolled oats no pre-baiting with unpoisoned bait is necessary. With bait kept continuously available, up to 16 days may be needed to obtain 100% kill of rats in the field. Although more expensive than other rodenticides labour costs are reduced, because frequent inspection visits are unnecessary, especially if 0·3–0·4% paranitrophenol is added to prevent mould growths. Paper feeding stations [covered trays] developed in Hawaii are illustrated and costs tabulated. It is believed that warfarin will be particularly useful at points where there is almost continuous migration of rats from waste land into maturing cane and around plantation houses where there are risks of accidental poisoning from the conventional baits.

4471. Lima Romero, J. J.
A contribution toward a practical method of payment for cane on a quality basis.
Proc. 24th annu. Conf. Asoc. Téc. Azuc. Cuba, 1950, pp. 203-8.

Under the proposed system described, payment for cane would be based on its raw sugar content, i.e. its yield of sucrose.

4472. Rouillard, G.
Méthode permettant de passer du brix réfractométrique au sucre commercial extrait % cannes. **(The refractometric brix method of measurement of the commercial sugar content of sugar cane.)**
Rev. agric. Maurice, 1951, **30**: 287-90.

The method as employed in Mauritius is described. In practice the percentage commercial sugar content is equal to the Brix result minus 7·5. The method is rapid and accurate but is only applicable if the canes come from adjacent plots grown under the same climatic conditions.

4473. Clarke, G. F.
Notes on dunder disposal methods.
J. Jamaican Ass. Sugar Tech. (*J.A.S.T.*), 1949 [issued 1950?], **13**: 55-6 [received 1952].

The use of dunder as a manure for cane gave encouraging results at Worthy Park, Jamaica [see *H.A.*, 21: 1126]. At least 10 tons per acre were needed to meet estimated requirements. A 600-gal. tanker was designed to apply dunder to 3 rows at a time and averaged 10 trips per day within 1 mile of the factory. Sulphate of ammonia was added at the rate of 2 cwt. to 10 tons of dunder. Costs of application, which are itemized, totalled £1 4s. 8d. per day, which, on a basis of NK fertilizer saved, represented a daily saving of £5 14s. 11d. or about £600 for the whole crop period.

4474. Barnes, A. C., Sexton, T. A. F., and Ive, H. S.
Further experiments on dunder.
J. Jamaican Ass. Sugar Tech. (*J.A.S.T.*), 1949 [issued 1950?], **13**: 56-60, bibl. 10 [received 1952].

Small scale trials are reported which were concerned with the concentration of dunder with and without the use of vacuum, the alteration of N, P_2O_5 and K_2O during concentration, the loss of acidity during concentration, and methods of converting concentrated dunder into a dry powdered form. It is concluded that methods for preparing a dry, free flowing powder rich in potash should be further investigated on a pilot plant scale and that the use of the material as a fertilizer should be tested in the field.

Tea.

(*See also* 4305, 4501o, s, v, y, z, 4502m, n, 4525, 4548, 4557, 4559.)

4475. Kisljakov, V. D.
Tea growing in new regions. [Russian.]
Priroda, 1952, **41**: 2: 36-48, illus.

Hitherto Georgia, Azerbaijdžan and the Krasnodar region have supplied almost all the tea grown in Russia, but in 1948 experiments were started to determine the possibility of growing tea in such widely different areas as Transcarpathia [bordering Czechoslovakia], Central Asia and the Soviet Far East. Notes are given on cultural methods practised and/or trials in progress in the various territories.

4476. DE JONG, P.
The effect of seed dressings on the rate of germination of tea seed.
Plant. Chron., 1952, **47**: 177-81.

Tea seed was treated with 3 commercial dressings: Tillex, a mercurial preparation containing 1·5% mercury; Agrosan G.N., an organo-mercury preparation containing 1% mercury; and Fernasan, a non-mercurial preparation containing tetra-methyl-thiuram-disulphide. Tillex- and Fernasan-treated seed showed significantly more germination than untreated seed at counts on the 3rd, 4th, 5th and 6th weeks. Agrosan G.N. was intermediate, the differences being significant in some weeks and not others. [For an account of an earlier trial see *H.A.*, 22: 3150.]

4477. EDEN, T.
Some agricultural properties of Ceylon montane tea soils.
J. Soil Sci., 1951, **2**: 43-9, bibl. 11, illus.

The soils of the wet and transitional grasslands on the highest of the 3 peneplains (averaging 6,000 ft.) forming the main mountain massif carry some of the oldest and most valued tea in Ceylon. Their remarkable water stability and resistance to erosion, their C and N status and their response to N and P are described.

4478. VINK, A. P. A.
Enige opmerkingen over bodem en bemesting in de bergcultures, in het bijzonder in de theecultuur. **(Some observations on soils and manuring in highland cultivation, with special reference to tea cultivation.)**
Bergcultures, 1952, **21**: 39-45.

A survey of the work that has been, and remains to be, done on the soils of W. Java and S. Sumatra is followed by suggestions for the type of manuring required on tea plantations on different types and conditions of soil.

4479. LAYCOCK, D. H.
The spread of the tea bush and the control of weeds.
Nyasaland agric. quart. J., 1951, **10**: 14-23, bibl. 5.

From observations and experiments at Swazi Experimental Station described here it is concluded that tea properly managed so as to maintain its spread will largely suppress weeds.

4480. HARLER, C. R.
The plucking of tea leaf.
Nyasaland agric. quart. J., 1951, **10**: 23-34.

Various systems of plucking, both hand and mechanical, used in different countries are discussed with particular reference to quality and labour needs.

4481. S[ARMAH], K. C.
Key for identification of the commoner root diseases of tea.
Serial Tocklai, **91**, 1952, pp. 9.

This serial covers 17 fungi and contains 5 keys based on (1) the external appearance of the bushes in the field, (2) indications on the collar region, (3) external appearance of root surfaces, (4) indications when root bark is peeled away and (5) indications when a cut is made into the root.

4482. S[ARMAH], K. C.
Key for identification of the commoner diseases of young tea plants in nursery or field.
Serial Tocklai **92**, 1952, pp. 4.

The key is based on the appearance of the young plants, indications at the collar and indications on the roots. Apart from fungus diseases it includes conditions due to eelworm, waterlogging, heat damage, etc. It does not include such well known diseases as blister blight and black rot.

4483. ANON.
Teekrankheiten in Japan. **(Tea diseases in Japan.)**
Gordian, Kaffee-u. Tee-Markt, 1951, **1**: 21: 13-14.

A brief note from a report of the Natural Resources Section of the Allied Supreme Headquarters, Tokyo, states that over 100 insects attack tea in Japan, of which, as in other tea growing countries, the red mite, thrips and tea cicada are of greatest importance. The main difficulty in controlling these insects appears to be the off-flavour imparted to leaves by many of the new and effective insecticides. Of the diseases blister blight and net blister blight, specific to Japan, are of great concern. The control of both pests and diseases plays a foremost part in the programme of the 14 tea research stations of the country.

4484. EDEN, T.
The control of armillaria root disease in tea.
Pamphl. Tea Res. Inst. E. Afr. **3**, 1952, pp. 10, bibl. 5, illus.

Of the root diseases of tea only *Armillaria mellea* appears to be widespread in East Africa. This pamphlet gives a clear account of the more readily observed symptoms of the disease, its mode and rate of spread, control by burning *in situ* and more especially prevention by ringing trees to be felled in new clearings to exhaust carbohydrate reserves in their roots. The commoner susceptible trees and plants associated with tea lands in East Africa are listed.

4485. VENKATARAMANI, K. S.
A tea root disease new to South India.
Nature, 1952, **169**: 1099-100, bibl. 11, illus.

A root disease of tea, new to South India and due to a species of *Cylindrocladium*, is described from one estate. It is not known whether it is a weak parasite or primary pathogen, but as a precautionary measure the elimination of all infectious material from the diseased area is recommended.

4486. LOOS, C. A.
Studies in blister blight control. X. Evaluation of some copper containing fungicidal dusts in the control of blister disease of tea.
Tea Quart., 1952, **23**: 6-11, bibl. 1.

2, 4, 6 and 8% formulations of proprietary dusts were applied to a fourth year crop at Talawakelle, Ceylon,

with a portable hand-operated duster at 5 and 10 lb. per acre every 5 days and at 10 lb. every 10 days beginning in May 1951. As the monsoon was comparatively light the control achieved may not be representative of severe weather conditions. All the 2% formulations gave inadequate control, i.e. were less effective than wet spraying. 4% Cuprosana dust showed promise of adequate control under normal conditions at 5 lb. per acre every 5 days, but 10 lb. every 5 days may be required. 6 and 8% dusts were not economic at prevailing prices.

4487. LAMB, J.
Crop protection by wet spraying compared with crop protection by dusting in 1951.
Tea Quart., 1952, **23**: 12-14, bibl. 4.

In 1951 good control of blister blight was easily attained with spraying owing to the prevailing conditions, and results with dusting were quite good but indicated the limitations of the method. For spraying 4 oz. 50% Cu fungicide in 10 gal. water applied with a pressure-retaining knapsack equipment at 12-15 gal. per acre, at intervals not exceeding 10 days, is still recommended. Portable machines are also required for dusting since the broadest band that can be effectively treated is 75 ft. Dusts which " carried " well gave good control at 4-6% Cu. On tea in plucking 5 lb. 4% dust every 5 days was effective. Tea leaf retains Cu deposited by spraying or dusting quite well under light rainfall but areas treated during heavy rainfall may require further treatment.

4488. GATEHOUSE, R. C.
Blister blight control on Dessford group in 1951.
Tea Quart., 1952, **23**: 15-18.

The following spraying and dusting treatments applied to different areas of tea recovering from pruning gave effective and equally good control: spraying with 2½-5 oz. Cu per acre per lb. in a suspension of 4 oz. Cuprokylt in 10 gal. water every week until fine weather in November and then every 10 days; dusting with 6% Cuprosana at 10 lb. per acre every 7 days until the shoots formed and then 5 lb. every 7 days. Costs calculated for 1,000 acres in plucking, yielding 700 lb. per acre for 6 months of the year, were: spraying, 7–9·3 c. per lb., excluding the cost of extra labour needed which roughly doubled the cost; dusting, 7·7–13·3 c. per lb., depending on method and strength.

4489. JOHNSTON, A.
Blister blight of tea in Malaya. 2. Results of two spraying experiments.
Malay. agric. J., 1951, **34**: 160-5, bibl. 3, illus.

In the first experiment described, equally good control of blister blight was obtained with 5 copper sprays: Blitox, Koneprox, Shell Copper Fungicide (all copper oxychlorides) and Perenox (cuprous oxide), all used at a strength of 0·25%, and bordeaux mixture 2 : 2 : 40. In each case the copper content was at 0·125%. The sulphur spray Spersul and the copper dust Perelan were less effective. In the second experiment Perenox was applied in 7 amounts ranging from 0·5 to 32 oz. per acre and in spray volume ranging from 5 to 40 gal. per acre. Satisfactory control was obtained with amounts of 2 to 8 oz. applied in 10 to 20 gal. water.

4490. SNIJDERS, J. H.
Bodembescherming en blisterblight. **(Soil conservation and blister blight.)**
Bergcultures, 1952, **21**: 139-45, bibl. 4, illus.

A warning is given of the dangers of drastic shade thinning and clean weeding, which have been recommended for the prevention of blister blight in tea plantations. It is shown that the result may be " operation successful, patient dies ". As a compromise, careful thinning where necessary and selective weeding or cutting of weeds is recommended.

4491. S[ARMAH], K. C.
Thread blight.
Serial Tocklai, **42/1**, 1952, pp. 3.

The thread blight disease of tea, caused by an unnamed fungus, is described. Control may be obtained by regular cleaning out following pruning and by reducing shade where this is excessive. Where the disease is severe it may be necessary to spray with a copper fungicide twice at an interval of 2 weeks between mid-April and the end of May. Painting the bark with a caustic wash after cutting back or heavy pruning will also act as a deterrent.

4492. KEEGEL, E. L.
Studies in blister blight control. IX. The effect of spray residues on the quality of manufactured tea.
Tea Quart., 1952, **23**: 2-6, bibl. 1.

Better teas resulted from sprayed areas than from comparable unsprayed areas, but not from deliberately oversprayed areas.

4493. W., E.
Welchen Coffeingehalt (Teingehalt) hat der Tee? **(The caffein content of tea.)**
Gordian, Kaffee-u. Tee-Markt, 1951, **1**: 17: 9-10.

The caffein content of tea is stated to be between 1 and 5% or even higher, while that of coffee averages 1·2 to 2%.

Other crops.

(*See also* 4501a, n, q.)

4494. BOTANICAL SECTION, MYSORE DEPARTMENT OF AGRICULTURE.
A brief note on areca industry in Mysore.
Mysore agric. Calendar, 1949, pp. 54-7 [received 1952].

Notes are given on methods of cultivation, harvesting, curing, drying, qualities of nuts recognized by the trade, and diseases. Marked variations have been observed in size, shape and quality of nuts and in the time of maturity of the palms, and a study of the varieties in cultivation is to be made. (See also *H.A.*, 22: 3163.]

4495. RAYMOND, W. D., AND SQUIRES, J. A.
Pewa or peach nuts from Trinidad.
Colon. Plant. Anim. Prod., 1951, **2**: 203-5.

Samples of nuts of a palm believed to be *Guilielma speciosa*, but possibly *G. utilis*, were examined chemically with special reference to their food value. The kernels are, however, so hard as to be practically

indigestible. They contain 31% fat that appears to be similar to other kernel fats, but it is unlikely that they would be an economic source for industrial extraction.

4496. SOUBIHE SOBRINHO, J., AND GURGEL, J. T. A.
Características das sementes de *Myrtaceae* frutíferas. **(The seed characters of fruit trees belonging to the family Myrtaceae.)**
[English summary ¾ p.]
Rev. Agric. Piracicaba, 1952, **27**: 83-90, bibl. 4.

A study is reported of the number of seeds, and other characters of the seeds and cotyledons, of the following Myrtaceous fruit trees: *Syzygium jambos*, *S. cuminii*, *Myrciaria cauliflora*, *M. tunciflora*, *M. jaboticaba*, *Myrciantes edulis*, *Eugenia edulis*, *E. uniflora*, *E. uvalha*, *E. brasiliensis*, *E. luschnatiana*, *Psidium guajava* and *P. araca*. The distribution of the number of seeds was shown to be in agreement with Poisson's series.

4497. PERRIER DE LA BATHIE, H.
Les Myrtacées utiles de la région Malgache. **(The useful Myrtaceae of the Malagasy region.)**
Rev. int. Bot. appl., 1952, **32**: 112-16.

Myrtaceous plants of economic importance grown in the Malagasy region—the Seychelles, Mascarenhas, Madagascar and the Comoro Islands—are fairly numerous. They are here put into three groups. I. Myrtaceae introduced from abroad, cultivated and not escaped from cultivation: these include species of *Eucalyptus* and *Eugenia*, *Myrtus communis*, *Melaleuca leucodendron*, and *Pimenta communis*. II. Plants introduced and now naturalized: three species of *Eugenia*, *Psidium guajava*, and *P. cattleyanum*. III. Useful endemic plants: these include a number of species of *Eugenia*. All the Myrtaceae of this region have, in general, the same properties as other plants of the family present in other tropical regions. They are always aromatic, their fruits are more or less edible and astringent, and their wood is always hard and odoriferous. Of the 60 species (not including *Eucalyptus*) growing in the islands, about 12 possess these properties to a marked degree.

4498. MALAVOLTA, E., AND OTHERS.
Nota prévia sôbre conteúdo de vitamina C em " cabeludinha " (*Eugenia tomentosa*, Camb.). **(A preliminary note on the vitamin C content of *Eugenia tomentosa* Camb.)**
[English summary ½ p.]
Rev. Agric. Piracicaba, 1951, **26**: 403-4, bibl. 2.

In ascorbic acid determinations on the fruits of *Eugenia tomentosa* surprisingly high values were obtained. The average for small green whole fruits was 1,418 mg. per 100 g., for ripe whole fruits 931 mg., for pulp without seeds 1,735 mg. and for skin 787 mg. The authors consider *Eugenia tomentosa* to be the richest of all Brazilian fruits in vitamin C.

4499. SINGH, L. B.
A new technique for propagating aonla (*Phyllanthus emblica*).
Sci. and Cult., 1952, **17**: 345-6, illus.

Hitherto the fruit tree *Phyllanthus emblica* [the Indian Gooseberry] has been propagated by seed and by approach grafting, though with only 25-30% success. In a trial at Saharanpur shield budding in early June onto 1-year-old seedlings gave 90% take and 70% grown plants.

4500. SINGH, L. B.
Preliminary trial on top working of *ber* (*Ziziphus mauritania* Lam.) in Uttar Pradesh.
Indian J. Hort., 1952, **9**: 1: 16-19, bibl. 2, illus.

Wild trees of *Ziziphus mauritania* were headed back when dormant in early April to 2, 4 or 6 ft. above ground level, coal tar being applied to the cut surfaces. Shoots arising from the stumped branches were shield budded in June (pre-rain), July (rainy period) or August (post-rain). Much the best results were obtained with June budding (95%) and with the trees headed back to 4 ft.

Noted.

4501.

a ALESSANDRI, G.
Conférences du Cycle des Corps gras du Centre de Perfectionnement technique. L'huile d'oïticica. **(Conference of the Fats Section of the Technical Improvement Centre. Oiticica oil.)**
Oléagineux, 1952, **5**: 279-80.
Oiticica oil, from the Brazilian tree *Licania rigida*.

b AMBROSE, C.
The root system of the coconut palm.
Ceylon Coconut Quart., 1952, **3**: 15-19, illus.

c ANON.
[Mauritius] Government Notice No. 169. Regulations under the Fruit Export Ordinance 1940.
Rev. agric. Maurice, 1951, **30**: 338-9.
Governing the export of litchis, pineapples and mangoes.

d ANON.
De koffiecultuur in Mexico. **(Coffee growing in Mexico.)**
Reprinted from *Bull. mens. Fed. nat. Commerce Cafés verts*, Oct. 1951, in *Bergcultures*, 1952, **21**: 51-5.
History, distribution and methods of coffee growing in Mexico.

e ANON.
L'avenir du palmier à huile au Dahomey. **(The future of the oil palm in Dahomey.)**
Oléagineux, 1952, **2**: 317-21, illus.
Measures being taken to rehabilitate the dwindling oil palm industry.

f BAKEWELL, S. E.
Cacao in Mexico.
Foreign Agric., 1951, **15**: 268-9.

g BARNES, A. C.
Sugar cane variety situation in Jamaica with reference to variety introduction and to the cane yield survey 1949.
J. Jamaican Ass. Sugar Tech. (*J.A.S.T.*), 1949 [issued 1950?], **13**: 25-9 [received 1952].

h BOCQUET, M.
La cueillette du caoutchouc sylvestre au Brésil. **(The gathering of wild rubber in Brazil.)** [French and English.]
Rev. gén. Caoutch., 1952, **29**: 157-61 French and 203-4 English, illus.
Technique described.

i CALLE, V. H.
Producción de alcohol con los desperdicios del café. **(The manufacture of alcohol from the waste products of coffee.)**
Bol. inf. Colombia, 1951, **2**: 22: 33-4.

j CARTER, W.
Recent developments in oriental fruit fly research.
J. econ. Ent., 1952, **45**: 274-9, bibl. 1.

k CLEMENTE, F. G.
El " picudo " de la plantenera (*Cosmopolites sordidus* Germar). **(The banana borer, *Cosmopolites sordidus*.)**
Bol. Pat. veg. Ent. agric., pp. 311-32, from abstr. in *Fruits d'Outre Mer*, 1952, **7**, *Suppl.* p. 52.
In the Canary Islands.

l COLACO, J.
A coffee nursery in Coorg.
Indian Coffee, 1952, **16**: 115-19.
Nursery practices including the use of basket pots.

m CRAMER, P. J. S.
Historique de la méthode Testatex. **(History of the Testatex method [of sampling young rubber].)**
Bull. agric. Congo belge, 1951, **42**: 655-70, bibl. 9, illus., and 1952, **43**: 455-62, bibl. 1.

n DYER, R. A.
A note on the distribution of the palms of South Africa with special reference to *Borassus* in the Transvaal.
S. Afr. J. Sci., 1952, **48**: 215-20, bibl. 20, illus.

o EDEN, T.
The use and abuse of shade trees in tea.
Pamphl. Tea Res. Inst. E. Afr. **2**, 1952, pp. 5.
The effects and management of shade.

p FRANCO, R. M., AND OTHERS.
Fosas para pulpa de café. **(Pits for composting coffee pulp.)**
Bol. inf. Colombia, 1951, **2**: 22: 15-20, bibl. 3, illus.

q FURTADO, C. X.
Palmae Malesicae. XI. The Malayan species of *Korthalsia*. XII. The Malayan species of *Plectocomiopsis*. XIII. The genus *Myrialepis*. XIV. The species of *Plectocomia* in Malaya. XV. The genus *Ceratolobus* in Malaya. XVI. The little-known Malayan genus *Calospatha*.
Gdns' Bull., Singapore, 1951, **13**: 300-24, 325-38, 339-44, 345-50, 351-9, 360-5, all illus.

r GERMAIN, R.
Les associations végétales de la plaine de la Ruzizi (Congo belge) en relation avec le milieu. **(Plant associations in the Ruzizi Plain (Belgian Congo) in relation to their environment.)**
Publ. Ser. sci. I.N.É.A.C. **52**, 1952, pp. 321, bibl. 4 pp., illus.

s G[LOVER], P. M.
Organisation of spraying [on tea estates].
Serial Tocklai **93**, 1952, pp. 5.

t GOSWAMI, P. C.
The relative sweetness of sugar and *gur*.
Sci. and Cult., 1952, **17**: 388-90, bibl. 6.

u HANSEN, V. A.
Tanganyikas flora. **(The flora of Tanganyika.)**
Horticultura, 1951, **5**: 73-9, 81-2.

v HARLER, C. R.
Tea soils and their management.
Nyasaland agric. quart. J., 1951, **10**: 50-65, bibl. 5.

w HUMBERT, R. P.
Erosion as a menace to the sugar industry of Hawaii.
Hawaii. Plant. Rec., 1951, **54**: 55-63, bibl. 2, illus.
With examples.

x JAGOE, R. B.
" Deli " oil palms and early introductions of *Elaeis guineensis* to Malaya.
Malay. agric. J., 1952, **35**: 3-11, bibl. 16.
A historical note [see also abstract 4382].

y DE JONG, P.
Copper fungicides in the control of blister blight of tea in South India.
Plant Prot. Overs. Rev., 1951, **2**: 4: 17-22, illus.
A brief history of their use.

z DE JONG, P.
Low-volume spraying.
Plant. Chron., 1952, **47**: 60.
Information on 5 more nozzles [see *H.A.*, 22: 3161].

4502.

a KRUG, C.
Viagem de estudos à Colômbia, Costa Rica, Guatemala e México. **(A study tour [of the coffee zones] of Colombia, Costa Rica, Guatemala and Mexico.)**
Reprinted from *Folha da Manhã*, 30 Jan., 6, 13, 20, 26 Feb., 5 March, 1952, in *Bol. Super. Serv. Café. S. Paulo*, 1952, **27**: 147-74.

b DE LEON, D.
Kadang-kadang disease of coconuts in the Philippines.
Foreign Agric., 1952, **16**: 103.

c LI, H. W., AND MA, T. H.
List of the chromosomal numbers of sugarcane varieties and sugarcane relative plants. [English with Chinese summary ½ p.]
Rep. Taiwan Sugar Exp. Stat., 1951, No. 7, pp. 47-54, bibl. 4.

d LUGARD, J. G.
Selección en general y en especial selección del café en Java. **(Plant selection, with particular reference to selection of coffee in Java.)**
Bol. inf. Colombia, 1951, **2**: 13: 40-6, bibl. 4.

e MARTINEZ ANDREU, A.
El picudo negro del plátano. (*Cosmopolites sordidus* **Germar.) (The banana root borer.)**
Agrotecnia, 1951, **4**: 83-91, from abstr. in *Turrialba*, 1951, **1**: 303.
The insect was killed within 48 hr. by dieldrin at 1: 1600.

f MYATT, O. W. D.
Impressions of Pindar in the Bundaberg area.
Cane Grs' quart. Bull., 1952, **15**: 109-10, illus.
Its performance in cane variety trials.

g NATH, J.
Cultivation of papaya.
Indian Fmg, 1952, **2**(n.s.): 3: 26-7.

h PATRON, A.
Le papaïne, préparation, propriétés, usages. **(Papain, its preparation, properties and uses.)**
Fruits d'Outre Mer, 1952, **7**: 57-61, bibl. 11, illus.

i PEMBROKE, E. A.
Q.50 in North Queensland.
Cane Grs' quart. Bull., 1952, **15**: 105-7, illus.
Its performance on different soils.

j RAGHAVAN, T. S.
How better canes are bred at Coimbatore.
Indian Fmg, 1952, **2**(n.s.): 3: 20-1, illus.
See also *H.A.*, 22: 1021.

k RAMIREZ-BERMUDEZ, J.
La broca del café (*Hypothenemus hampei*) (Ferrari 1867). **(The coffee berry borer.)**
El Café de El Salvador, 1951, **21**: 577-97, from abstr. in *Bol. inf. Colombia*, 1952, **3**: 28: 8-9.
Data on the insect and its control.

l RIVALS, P.
Notes sur les diverses espèces à fruits comestibles existant à l'Ile de la Réunion. **(Notes on the various species of fruits found growing in Réunion.)**
Rev. agric. Réunion, 1951, **51**: 149-55, 207-13.
Includes historical notes on introductions and local names. To be continued.

m ROBERTS, E. A. H.
The chemistry of tea fermentation.
J. Sci. Food Agric., 1952, **3**: 193-8, bibl. 19.

n ROBERTS, E. A. H., AND WOOD, D. J.
The fermentation process in tea manufacture. 12. The origin of carbon dioxide.
Biochem. J., 1952, **50**: 292-7, bibl. 23.

o ROMÁN, F., JR., AND PIÑERO, M.
An economic study of the hauling of sugar cane by motor truck. Puerto Rico, 1948 and 1949. [Spanish summary 3½ p.]
Bull. P.R. agric. Exp. Stat. Río Piedras **100**, 1951, pp. 41.

p SCHMIDT, N. O., WIGGINS, L. F., and YEARWOOD, R. D. E.
A rapid method for the determination of moisture in bagasse.
Proc. 1951 Mtg B.W.I. Sugar Tech., British Guiana, pp. 163-70, bibl. 2, illus.

q SCHROEDER, R.
Distribución de la temperatura en una plantación de café. **(Temperature distribution in a coffee plantation.)**
Bol. inf. Colombia, 1951, **2**: 23: 21-30.

r SENANAYAKE, W.
Mechanised agriculture on a coconut estate.
Ceylon Coconut Quart., 1952, **3**: 21-6, illus.
Methods demonstrated on a field day.

s SHARP, C. C. T.
Progress of breeding investigations with *Hevea brasiliensis*. II. The crosses made in the years 1937-1941.
J. Rubb. Res. Inst. Malaya, 1951, **13**: 73-99, bibl. 4, being *Commun.* 275.
Results up to the end of 1950.

t TIXIER, P.
Oïdium des Hévéas. **(Oidium on hevea.)**
Bull. agric. Congo belge, 1951, **42**: 671-4.
A brief note on history and control.

u DU TOIT, J. L.
Foliar diagnosis in sugar cane. Some impressions of Mauritius practice.
S. Afr. Sugar J., 1952, **36**: 165-7.

v TRELOAR, L. R. G.
Natural rubber.
Endeavour, 1952, **11**: 92-6, bibl. 6.
A review of its properties.

w WOLCOTT, G. N.
The present status of economic entomology in Puerto Rico.
Bull. P.R. agric. Exp. Stat. Río Piedras **99**, 1951, pp. 21, bibl. numerous, illus.

NOTES ON BOOKS AND REPORTS.

Books.

4503. APPEL, O.
Handbuch der Pflanzenkrankheiten. Sechster Band. Pflanzenschutz. Erste Lieferung. **(Handbook of plant diseases. Vol. VI. Plant protection, Part I.)**
Paul Parey, Berlin and Hamburg, 2nd edition, 1952, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. xv+448, bibls. numerous, 78 DM.

This is the first part of volume VI of Sorauer's well-known handbook, revised by Appel, on the disorders, diseases and pests of plants and their control. Vol. VI was published as a double volume in 1939 and 1941. Since that time much work has been carried out in many countries on plant protection, and many alterations and additions have been found necessary to bring the information up to date. This second edition again appears in two half volumes but is now divided into several parts, and the present book is the first part of the first half volume; the second part being promised for later in 1952. The first part is in two sections, a short one (pp. 1-25) on the economic significance of plant protection, and a long one on the problems of plant protection. The latter consists of 4 sub-sections, the first on the prevention of outbreaks of plant diseases and pests, the other three on soil disinfection by biological, physical and chemical methods. This last sub-section occupies about half the whole book and covers a wide range of chemicals, including the newer synthetic organic compounds. The numerous references cited are given as footnotes on the relevant pages. This book, despite the absence of illustrations, will be a useful work of reference for a particular aspect of plant protection.

H.W.

4504. BARTHOLOMEW, E. T., AND SINCLAIR, W. B.
The lemon fruit.
University of California Press, Berkeley, and Cambridge University Press, London, 1952, $9\frac{1}{2} \times 6$ in., pp. 163, bibl. 12 pp., 34s.

The lemon fruit in the sense referred to here is the fruit of the acid lemon, *Citrus limonia*, in its mature form. The authors include a brief introductory chapter, which contains notes on Californian production, varieties, fruit set, maturity, storage and the general characters of the fruit, but they do not pretend to cover these subjects at all fully and they refer the reader interested in them to that well-known work "The Citrus Industry" by Webber and Batchelor. Their interest lies in the composition, physiology and products of the lemon fruit after it has been harvested. Commercial lemon growing is largely confined to Italy, Spain and the United States, and amongst the latter California, whence the authors have drawn a major part of their information, is the leading producer. In the British Commonwealth as a whole comparatively few lemons are grown, and it is doubtful whether many people realize that, to quote the preface, "the lemon probably has a greater variety of culinary, beverage, industrial and medicinal uses than any other fruit". Equally, it will not be generally recognized, even among research workers, how numerous are the studies that have been made on the fruit and its products, especially in the past thirty years. It is the purpose of this book to assemble and summarize the more important information elicited from these studies. The results given apply primarily to American work and are thus not fully comprehensive, but some work from other countries is cited and certain comparisons are also made between the composition of the lemon and that of other citrus fruits.

The second chapter on composition and physiology forms the major part of the book. It is divided into a series of sections, each of which deals with an organic constituent or group of organic constituents of juice, peel or seeds, or with such attributes as specific gravity, colour, moisture, pH and inorganic constituents. The effects of storage on juice quantity and investigations on respiration are also discussed. The final chapter is again comparatively short and deals concisely with work on lemon products obtained from the whole fruit and its various parts.

Although well arranged and clearly expressed, this book is not designed to be read as a textbook; the information it contains is too condensed and the Harvard system of annotation, in which all the authors cited are named in the text with the dates of their publications, does not make for easy reading. On the other hand its arrangement makes it an excellent book of reference, especially as it is supported by both author and subject indexes as well as by an extensive bibliography. It will prove a useful addition to the libraries of persons interested in the growing of lemons and especially in their marketing and processing.

G.K.A.

4505. BOSSARD, R.
Le forçage des plantes ornementales. **(The forcing of ornamental plants.)**
Baillière, Paris, 1952, $7\frac{1}{2} \times 5$ in., pp. 230, bibl. 28, illus., 750 fr.

Those interested in the out-of-season production of flowers will find in this well presented little book a summary of most of the modern techniques of forcing as well as a practical guide to their commercial application. In the first 50 pages the various types of forcing, with and without heat and by retarding development, are differentiated, and the different methods of breaking dormancy, such as desiccation, defoliation, cold treatment and chemical treatments, are described in clear, simple language, the principles being illustrated throughout by reference to their effect on specific plants. The student will be glad to find that mention is also made of methods still in the experimental stage, such as treatment with radioactive substances, but since the purpose of this book is essentially a practical one these references are brief. Most of the book deals in detail with the individual cultural treatments given to the more important kinds of shrubs, bulbs, perennials and annuals, which are submitted to forcing. The amount of space devoted to each plant is determined by its commercial importance, thus hydrangeas, roses, mimosa, azaleas and lilac take pride of place among the shrubs, while sweet peas are the only annuals dealt with in detail. Some of the illustrations are archaic.

P.R.-D.

4506. BROWN, A. W. A.
Insect control by chemicals.
Chapman and Hall, London, and John Wiley and Sons, New York, 1951, 8½×5½ in., pp. 817, bibls. numerous, illus., £5.

Although at least three authoritative books have appeared in the last four years dealing with insecticides from the chemists' angle, the absence of a fourth edition of "The Scientific Principles of Plant Protection" makes this extensive survey from the zoologists' angle doubly welcome. The last decade has seen such developments in ammunition and fire-power that the field of insect control can now scarcely be covered by one man. Prof. Brown has, nevertheless, made a bold and, on the whole, successful attempt to do so, albeit in no small compass. Beginning with a review of available toxicants and some of the solvents, emulsifiers and other adjuvants in common use, he passes to a long chapter on the relation of chemical structure to toxicity toward insects, and thence to chapters on the mode of entry of poisons into insects and on the mode of action when such toxicants have gained entry. Two chapters follow on problems of application, including the use of aircraft, and then chapters on the hazards presented by the use of insecticides to mammals, including man, and to plants, respectively. A chapter is devoted to chemical control of phytophagous insects, taken class by class, and another to that of insects afflicting man and domestic animals, including stored-products pests. Finally, the effects of insecticides on birds, fish and other natural fauna, and on total insect populations are considered. It should be understood that "insects" includes Acarina and "insecticides" covers acaricides and ovicides. The important field of eelworm control is not included.

The reviewer would like to draw attention to the important principle laid down at the beginning of Chapter II, that "the use of more general poisons may be avoided" and, moreover, should, a principle which has a great bearing on the theme of the last chapter. It must be borne in mind, of course, that more specific insecticides (and likewise fungicides, etc.) may increase rather than reduce the number of spray applications in some years, and that many different insecticides cannot be produced so cheaply as large quantities of a few. This may have to be accepted by the grower as well as by the manufacturing chemist, if Prof. Brown's view is sound.

It would be interesting to know if the author wrestled with himself over the inclusion of Chapter I at all. Obviously it is handy to the reader, especially the non-chemist, to have the chemical composition of toxicants and adjuvants in current use set out alongside the biological data. But, as all the data and much more are available in the books by Frear, de Ong and Shepard, it would have been better if Chapter I had been more carefully prepared. As it is, four definite errors were found in the names of formulae of chemicals, and this misfortune is even more serious in Chapter II where at least nineteen errors may be detected. To mention one or two: The name *n*-butylcarbitol thiocyanate cannot be used for β, β′-dithiocyanodiethyl ether, but it can for β-butoxy-β′-thiocyanodiethyl ether mentioned lower down (p. 20), and "Systox" is not based upon schradan *alias* OMPA (*sic!*). Moreover, "Bladan" was an emulsifiable liquid, not an emulsion. It is undesirable to state that pure parathion boils at 375° C. without mentioning that above 140° C. it begins to isomerize so that by 375° C. it must be far from pure (p. 17). There is an unfortunate lack of uniformity about the naming of the dinitrophenolic compounds on pp. 19-20; if DNOC, why not DNOCHP and DNOBP, and if 4,6-dinitro-6-cyclohexylphenol, why not 4,6-dinitro-6-*sec*-butylphenol? l-β-pyridyl-α-N-methyl-pyrolidine is surely not "the shortened name" for l-β-nicotine (p. 22)?

Again the reviewer suggests that the LD_{95} value is essential rather than "useful" for practical purposes (p. 65). On p. 68, the author has included parathion in his list of insecticides with symmetrical molecules, whereas it should, of course, be in the other category mentioned in his next sentence; moreover, the sulphur atom has been left out of the formulae for parathion and EPN300 on p. 158. β-fluoroethyl alcohol and ethylene fluorhydrin are the same thing (p. 89), and "xylene" in Table 9 on p. 100 should read "toluene", while on p. 137, with reference to diphenyl ethers, one must read "latter" for "former".

Repetition of information in different ways is inevitable in a book looking at the same materials from different viewpoints, and, with a few exceptions, unnecessary duplication has been well avoided.

The most important criticism which the reviewer has to offer of this comprehensive book refers to the references given at the end of each chapter. Ostensibly, these references are given in full, but it becomes apparent as soon as one checks up a reference that the titles of the papers as given are not those published but only a garbled version which, presumably, the author found convenient for his own use. The reviewer feels that titles in references should be given exactly as published or not at all. He also regrets that the pagination given is not always accurate.

The use of the deplorable term "miticide" has been almost completely avoided, and does not appear in the index which, it may be said, is large and really useful. Unfortunately, the equally ugly term "lousicide" frequently sears the pages; must this term be used? The removal of blemishes, some of which have been specified above, would greatly enhance the value of a second edition of a notable book.

A.H.M.K.

4507. CENTRE DE DOCUMENTATION CARTOGRAPHIQUE ET GÉOGRAPHIQUE, PARIS.
Mémoires et documents. Tome II. (**Notes and records. Vol. II.**)
[*Publ.*] *Centre nat. Rech. sci. Paris*, [1951?], 10½×8 in., pp. 301, bibls., illus., maps, 1,500 fr.

Part A (pp. 150) of this volume is devoted to a study of fruit production in the Paris region. The paper, by J. Tricart, gives an admirable account, abundantly illustrated with maps and sketches, of the localization of fruit areas, of the types of fruit growing practised, and of the factors affecting the development of the industry. From a detailed study of the environmental requirements of the various fruit species and of the soils and climate of the Paris region, the author concludes that dessert fruits are on the whole grown in areas to which they are very well adapted, except in the case of private gardens, although some suitable districts

remain unexploited. Cider apples (dual purpose varieties), on the other hand, are generally grown in highly unsuitable areas. The reason for some of the discrepancies of distribution is shown to lie in the availability of suitable labour. In this connexion an interesting analysis is made of the influence of agricultural tradition on the development of the industry, an industry which increased 4-fold between 1910 and 1944. Finally, an account is given of the economic and social organization of fruit production in this region, and local methods of nomenclature and associated culture are examined.

4508. ELEY, C.
Twentieth century gardening.
Country Life, London, 3rd edition, 1952, 9×6 in., pp. 288, illus., 25s.

The book is described as an introduction to garden making for beginners. Alas! few beginners in these times of stress and change are likely to have occasion or opportunity to create and subsequently enjoy the kind of garden Mr. Eley has in mind, namely, a garden of permanence and ordered design built up to slow perfection over the years. But recognizing this he is content if he can induce the migratory occupier of a garden to leave behind him in every case some lasting memorial of his passage. In this, the third, edition, except for certain amplifications and additions the text has been left unaltered, and rightly so, for though extensive gardens become more of a burden than a pleasure the principles recorded here hold good for large and small. Even were this not so the book would still be worth acquiring, for it possesses a literary distinction not usually encountered in horticultural writings that also purport to instruct. For though Mr. Eley knows his metaphorical onions from A to Z he is not continuously ramming them down our throats, but mingles teaching with sapient discourse pleasantly salted by a pungent and unforced wit. The avowed object of the book is to interest the young beginner. The young beginner will be interested, so too will experienced maturity. The aged may but ponder wistfully on what might have been, for, as we are rather unfeelingly reminded, garden making is essentially a long term proposition, whereas grandfathers are not. Almost entirely the book is concerned with trees and shrubs, their selection, proper placing and management considered from the standpoints of public and private gardens, roadside planting, shelter, shade and hedges. Conifers, deciduous trees and evergreens are given separate chapters.

A large number of species are discussed in detail. The author protests he is telling us nothing new, but if the news is sometimes stale the dish is rendered most palatable by the spice with which it is served. No direct references have been made to the many gardens visited or discussed, for fear that the possessors might be disturbed by unwanted visitors. That was in 1923. In 1952 when our Stately Homes are held together by the half-crowns of the inquisitive, and gardens by the hundred, in the cause of charity which may or may not begin at home, are thrown open to the public, such consideration lacks point. There are, too, some delightful garden photographs and it is tantalizing that misplaced anonymity should prevent us from going to see for ourselves. The material added on revision might well have included some footnotes of identification. The final chapters are on gardening books, gardening fashions, nomenclature and botany. The first is useful, the last two brief and elementary, but that on garden fashion a delight, being an understanding and sometimes caustic survey of the foibles of the past, with Capability Brown and Humphrey Repton cast as 1st and 2nd murderers.

G.St.C.F.

4509. ELLENBERG, H.
Landwirtschaftliche Pflanzensoziologie Band I. Unkrautgemeinschaften als Zeiger für Klima und Boden. **(Agricultural plant sociology. Vol. I. Weed associations as indicators of climate and soil.)**
Eugen Ulmer, Stuttgart, [at present Ludwigsburg], 1950, 9×6 in., pp. 141, bibl. 40 [received 1952].

The ecology of plant associations is a comparatively young branch of botanical studies and the possibility of its practical application is as yet far from exhausted. With his series of three volumes* the author makes therefore an important contribution to the new science of agricultural plant sociology. The handbook as a whole addresses itself chiefly to the farmer, but the volume under review, which deals with the principles underlying the application of plant sociological observations, has much of interest to offer to horticultural research workers and growers wanting to assess the climate and soil characteristics of a particular site. While soil analyses and meteorological data throw light only on certain factors, the weed flora of a plot reflects the total of environmental influences and may be used as a complementary, *biological* measuring instrument of locality effects. The question arises how to gauge such an instrument, or in other words, how to standardize the evaluation of field records. From the experience gained in thousands of surveys the author has developed a method of diagnosing environmental conditions from the quantitative and qualitative composition of the weed flora on a given site. He explains in detail how to conduct a survey in a selected area representative of the field. An obvious drawback to the method is that its application is limited to certain periods of the year and to fields that have not recently been subjected to mechanical or chemical weed control. A list of weeds in the alphabetical order of their scientific names is appended with notes on their temperature, water, pH and many other requirements. V.H.G.

4510. FERNANDEZ VALIELA, M. V.
Introducción a la fitopatologia. **(Introduction to phytopathology.)**
Talleres Gráficos "Gadola"—Rivadavia 785, Buenos Aires (Republica Argentina), 2nd edition, 1952, 10½×7½ in., pp. xxiv +872, illus., $ Argentine 120.

Ten years ago M. V. Fernandez Valiela published his "Introducción a la fitopatologia" which at that time must have served a very useful purpose in bringing together information for students of plant diseases in Argentina and probably also for those of other Spanish-speaking nations of South America. In this second edition, he gives a more complete survey of the

* Vols. 2 and 3 concern pastoral and agricultural conditions.

diseases of crop plants in South America. It is in eight parts. Part I is a general introduction with a historical outline of phytopathology in Argentina and notes on losses caused by plant diseases. In parts II and III classifications of plant parasites are given (bacteria and fungi), and the various diseases caused by them are described. Methods for the isolation and cultivation of pathogenic microorganisms are given; a folder in the body of the book tabulates the chief cultural characters of 11 important bacterial plant pathogens, and another illustrates 5 cereal rusts. Part IV includes a general account of plant viruses with methods for their identification and with descriptions of the chief plant diseases caused. Part V is a short chapter mentioning a number of parasitic flowering plants with a more detailed account of *Cuscuta* on alfalfa. In Part VI physiogenic plant disorders are described, including those due to deficiencies of "major" and "minor" chemical elements in plant nutrition, and methods of recognizing such deficiencies are noted. Various fungicides are described in part VII, including the newer organic preparations. The last part discusses the legislative measures in operation in Argentina against the entrance of pests and diseases, and international action to check the spread of plant diseases. To each sub-section is added a list of the relevant literature. In addition to the folders in the body of the book there are two others at the end, one showing the method of distinguishing bacteria by their morphological and cultural characters, the other giving a geneological classification of the fungi with illustrations of typical generic forms. While much use is made of the results of work carried out by plant pathologists in other countries, the author's emphasis is on Argentinian work. As the title indicates, this book is not intended as a handbook on the practical control of plant diseases, and so will not appeal to growers, but as an introduction to the study of the problems involved in the science of phytopathology it will be invaluable to Spanish-speaking botany students who may be attracted to specialization on these lines. H.W.

4511. HELLYER, A. G. L. (editor), AND OTHERS.
The horticultural exhibitor's manual.
Collingridge, London, 1952, 9×6 in., pp. 335, illus., 21s.

Sixteen experienced and successful exhibitors contribute each an article on their speciality, be it flowers, fruit or vegetables. The idea has been not so much to provide a detailed guide to the general cultivation of the plants considered, thought in point of fact this is fairly fully covered, as a compendium of all the special points of cultivation and refinements of showmanship which mark the difference between the expert and the novice. One thing is clear. Those who esteem peace of mind and a quiet life above the glories of achievement should not join the ranks of horticultural exhibitors, and if they read this book they are not likely to. The time, trouble and forethought involved in producing an exhibition specimen of almost anything in perfect condition at the right moment, which is when the judge's eye lights upon it—and in keen competition even minutes seem to count—is beyond belief. Exhibiting is not just a matter of a few days nursing before the show. The work starts months beforehand, entailing close and constant attention to innumerable small details happily ignored by the common gardener, and including, when it comes to timing, complicated excursions into the higher mathematics beside which navigating, say an aeroplane in the dark, must seem quite simple. The pruning of roses, for instance, to achieve perfection on a given date must be timed to a day, a week will not do, and is dependent on the date of the show, the growth rate of the variety (no two kinds have the same), local conditions of cultivation and a correct forecast of the probable state of the weather as picking day approaches. In general the devices and expedients to which exhibitors resort to get their plants to the post looking their best make instructive and sometimes amusing reading. It is not necessary to be an exhibitor to enjoy this book. Each of the contributors writes from a deep knowledge of his plants and each has pertinent inside information to reveal, based on personal experiences that have led him to triumph or, may be, disaster. The editor contributes a well-considered article on the show schedule which harassed committees should welcome. The book is well and usefully illustrated. The delicate duck egg green of the cover will look charming on the occasional table but is unlikely to survive a visit to the potting shed. G.St.C.F.

4512. HEWITT, E. J.
Sand and water culture methods used in the study of plant nutrition.
Tech. Commun. Bur. Hort. East Malling **22**, 1952, 10×7¼ in., pp. 241, bibl. 943, illus., 42s. or $6.25.

In the second part of this work the author gives a detailed, illustrated account of the actual methods used at Long Ashton. In the first he offers a comprehensive review of previous work in an increasingly important field. Among subjects considered are: plant containers, nutrient media, micronutrients, culture solutions and their application and renewal, the comparative merits of sand and water methods and the influence of environmental and biological factors on the behaviour of culture plants.

A full subject index and a combined author index and bibliography of nearly 1,000 entries are included.

4513. HYAMS, E.
Grapes under cloches.
Faber and Faber, London, 1952, 9×5½ in., pp. 133, illus., 12s. 6d.

If anyone wants encouragement to become an English "vinearoon" he will find plenty here, for Mr. Hyams hands out his overbrimming enthusiasm in full measure. He seems to have the answer to all the "Buts". If we say, "but the vine won't grow in the open in England", his adequate reply is that it is being grown successfully. If we fear the demands of a difficult crop he more or less replies "stuff and nonsense, it's a trouble-free crop". When we, somewhat abashed, timidly return to the attack with moans about lack of sun and inadequate ripening, he bowls us out with the injunction to use the right varieties, of which he gives us lists and, moreover, tells us where to get them. And if vines in the open are easy, all the more so are vines under cloches, unless of course, cloches are allergic to you and suffer accordingly.

Granted, however, that our would-be vinearoon is not pathologically maladroit, that he has the necessary

enthusiasm for table grapes or wine and is willing to learn, here is a tear-less manual on vinegrowing without a single dull line. Mr. Hyams, who dedicates his book to another vine enthusiast, Mr. Barrington Brock, deals in turn and in practical detail with the following: First principles; varieties; soil and site; stakes and wires; planting, first pruning and propagation; pruning and forming the cloched vines; cloches; spring work; summer and autumn work; pests and diseases; wine making; grafting vines; raisin drying. Photographs and diagrams and a short glossary enhance the value of this pleasantly produced, useful book. D.A.

4514. MACSELF, A. J.
The amateur's greenhouse.
Collingridge, London, 4th edition, 5th impression, 1952, 9×6 in., pp. 302, illus., 18s.

We are glad now to bring this book to the attention of those of our readers who have not already discovered it since its revision in 1947.

The author does what he sets out to do, namely, tell the keen and energetic amateur how to get the most out of his greenhouse. He deals in turn in simple terms with construction, heating by gas, coal, oil and electricity, routine management, propagation, and hygiene. These chapters are noticeable for practical suggestions rather than theoretical discourse. Most of the book is devoted to descriptions, notes on cultivation and propagation of different flowering plants. Further chapters concern (1) annuals and biennials in pots, (2) bulbs in pots, (3) the cultivation in the greenhouse of cucumbers, tomatoes, and such other vegetables as beetroots, carrots, french beans, peas, turnips, marrows, and winter and spring salad crops, (4) grapes, peaches, melons and figs and (5) cacti. Finally, a calendar of the year's work is set out. It seems to us an unpretentious, inexpensive book which the English amateur will find extremely useful. D.A.

4515. MCELROY, W. D., AND GLASS, B. (editors).
Copper metabolism. A symposium on animal, plant and soil relationships.
Johns Hopkins Press, Baltimore, 1950, 9×6 in., pp. viii+443, 50s.

At the Symposium which was held at Johns Hopkins University under the sponsorship of the McCollum-Pratt Institute in June 1950, 17 papers were read. Of these the 4 mentioned below are of interest to horticulturists. A (free) 36-page summary of the Symposium, by the junior editor, is printed separately as *Contr. 5 McCollum-Pratt Inst., Johns Hopkins Univ.* Baltimore.

DAWSON, C. R.
The copper protein, ascorbic acid oxidase, pp. 18-43, bibl. 42.

The characteristics of the enzyme are set forth. It would appear to become irreversibly inactivated during the catalytic process, which takes place rapidly and is not a result of any of the products formed. Since this inactivation is consequently inherent in the nature of the enzyme it may be due to some irreversible rupture of the copper protein bond. New evidence is brought forward in favour of the contention that the Cu is actually bound in a protein complex and is not free or ionisable. To account for the nature of the enzyme reaction and inactivation the author puts forward the hypothesis that Cu is divalent to start with, that it alternates between the divalent and monovalent states during catalysis and that exchange of the Cu only occurs when the enzyme Cu is monovalent. Since Cu is exchanged only in the presence of O as well as of ascorbic acid it seems probable that a ternary complex of O, enzyme and substrate is formed during the reaction.

NELSON, J. M.
Phenol oxidase and plant respiration, pp. 76-87, bibl. 11.

A review article.

ARNON, D. A.
Functional aspects of copper in plants, pp. 89-110, bibl. 52, illus.

This paper is a review of the overall effect of Cu on plant growth and physiological activity and of the evidence bearing on the localization of the function of Cu in the living cell through its being a constituent of specific enzymes or enzyme systems. Subjects discussed are Cu as an essential element for higher plants, the effect of a variable Cu supply on plants, the participation of Cu in the metabolism of green plants, and Cu enzymes in plants.

STEINBERG, R. A.
The copper nutrition of green plants and fungi, pp. 115-37, bibl. 85, illus.

A historical review.

4516. ORDISH, F. G.
Untaken harvest.
Constable and Co., London, 1952, 8½×5½ in., pp. 171, bibl. 118, 15s.

Most scientists, by reason of their early training, would prefer to confine themselves to " pure " research and to leave the exploitation and adaptation of the facts they establish to others of a different frame of mind. In recent years more recognition has been made of the fact that this leads to much " frustration " of science, and Mr. Ordish comments (p. 122) that the " scientist who has discovered the remedy for a pest . . . must not be surprised if it is not taken up " unless he has " studied the economics of his remedy and the psychological factors involved in applying his method ". It is probably safe to say that all scientific investigation has been begun with an *ad hoc* problem and this has been followed by attempts to get the work on to an ever broader basis. If Mr. Ordish's " earnest scientist " is to provide this fundamental knowledge, he cannot well study also the economics and psychology of crop production, except at second-hand. It is therefore very important that information of the type presented by Mr. Ordish should be made available to scientists working in the field of crop protection, and the author's call for a much more intensive study of the losses due to pests, diseases and weeds is timely, to say the least. If the Commonwealth Bureau of Agricultural Economics, referred to on p. 138, comes into being, the basis will exist for the provision of the data which all of us would welcome.

The view is expressed in this book that statements of losses in monetary terms tend to obscure the full effects of damage by competing plants, animals and micro-organisms. In the case of crops having a high value per acre, the financial loss is very significant, but in the case of most vegetables and other crops of a low value per acre the real loss is the acreage, which has to be devoted to making up the deficit, and which would be

available for other crops if the pests had been controlled. This "untaken harvest" (untaken by man, that is) is quite considerable even in countries which have a highly-developed agriculture, and over the whole world, the author reckons, is equivalent to the total loss of all the crops produced in the U.S.A. (p. 151). It can also be expressed as the waste of effort of a considerable proportion of the farming community, amounting to the work of some 50,000 farm workers in the United Kingdom alone (p. 33).

An interesting conclusion is reached (p. 50) that, although pest or disease can never benefit the consumer or the individual grower, it may, under a system of price support at least, benefit growers as a group, who can include the cost of pest control in their capital outlay and so actually demand a profit on that cost. It seems unlikely, however, to be a serious threat to the consumer's pocket, as most growers, like other human beings, are more concerned with individual rather than group advantage.

A few errors and inconveniences in the book call for mention. Thus not all transverse tables and graphs are turned the same way (compare p. 73 and p. 99), and qualifying adjectives and phrases are not always punctuated with commas (e.g. p. 142). In the bibliography it seems undesirable to depart from the usual practice of printing volume numbers in heavy type. It is also surprising that books are not referred to in their most recent editions; thus a revised edition of "The Pests of Fruit and Hops" appeared in 1946, and Wigglesworth's "The Principles of Insect Physiology" reached its fourth edition in 1950. The statement on p. 142 that calcium arsenate preceded lead arsenate does not accord with the use of lead arsenate in 1892, while the earliest "textbook" record of the use of the calcium salt is 1907. The tribute on p. 139 to the work of "systematic entomologists, mycologists and other such workers" conjures up fantasies beyond the dreams of Lewis Carroll.

Such minor blemishes scarcely detract, however, from a lucid and forceful exposition of an important theme, and the book will well repay study. A.H.M.K.

4517. STILES, W.
Trace elements in plants and animals.
Cambridge University Press, London, 2nd edition, 1951, 9×5½ in., pp. 189, bibl. 446, 15s.

The first edition of this valuable book was reviewed in *H.A.*, 1946, 16: 2313, when the chief points made were that it was an excellent introduction to the subject and a useful reference book for those working on trace elements. Apart from a few minor corrections and the additions of 14 new references and 1 new illustration from new work by Hewitt at Long Ashton it remains unaltered. Is it too much to hope that in the next edition the eminent author will at least sum up the work of the years since 1946? D.A.

4518. TURRILL, W. B., AND MILNE-REDHEAD, E. (editors).
Flora of tropical East Africa. Oleaceae.
Crown Agents for the Colonies, London, 1952, pp. 31, illus., 2s. 9d.

A cover note lists the families of vascular plants represented in the flora of tropical East Africa and explains that the accounts of each angiosperm family will appear with separate pagination. So far floras covering the Oleaceae and Ranunculaceae have appeared. The former, under consideration here, contains a key to the species in each genus and concise botanical descriptions of the species. One or two species in each genus are illustrated.

4519. WILLIAMS, R. O., AND WILLIAMS, R. O., JR.
The useful and ornamental plants in Trinidad and Tobago.
Department of Agriculture, Port-of-Spain, Trinidad, 4th edition, 1951, 8½×5¼ in., pp. 335, $ Trinidad 2.00 [8s.].

The first edition of this book, compiled by W. G. Freeman and R. O. Williams, appeared in 1927 and a second edition was published in 1928. A third edition by the present authors, which contained additional information on some crops of economic importance and notes for local gardeners on the cultivation of vegetables and other plants, appeared in 1941. The present edition, issued last year, was prepared in Zanzibar, where the senior author recently produced a companion volume in *The useful and ornamental plants in Zanzibar and Pemba*, which was reviewed in *H.A.*, 21: 2136. It does not, therefore, contain information on the latest plant introductions to Trinidad, but these are understood to be few in number. Apartfrom additional notes on a few plants such as the cashew it is essentially the same book as the third edition.

The plants described, which must surely include the great majority of fruit, vegetable and ornamental species grown in the wet tropics, are, with the exception of a few special groups such as the orchids, arranged in alphabetic order under their botanical names. An extensive key is provided in which plants are grouped according to their use, type of growth and ornamental features, and from which it should generally be possible to identify any particular plant or tree without prior knowledge of its botanical or common name. The approach throughout is that of the horticulturist rather than the botanist.

It is possible to make minor criticisms of the arrangement, and there are, as must be almost inevitable in a low-priced book of this type, some printer's errors, while in the particular copy sent to us there were certain inconsistencies in the text which were rather disconcerting until it was noticed that a few pages were out of order. The authors themselves deplore the absence of illustrations, a measure adopted in the interests of economy, and the dull grey paper cover would certainly be more appropriate to a government publication on taxation than to a work of this sort. Having said the worst one should hasten to add that both the paper used and the larger, clearer print show an improvement on the earlier editions, and at a price equivalent to 8s. the book is very good value for money, and will, it is hoped, continue to give pleasure and prove of interest to a wide range of readers in tropical countries.

G.K.A.

Reports.

4520. AMSTERDAM. ROYAL TROPICAL INSTITUTE.
Inlichtingen en Onderzoekingen van de Afdeling Tropische Producten in 1951.
(Information and research from the Tropical Products' Department, 1951.) [English summary pp. 16], 1952, pp. 75, bibls., illus., fl. 3.50.

Essential oils: Analyses are tabulated of the indigenous form of lemongrass (*Cymbopogon citratus*) grown in various parts of Surinam. The citral content proved to be lower than that of the oil obtained from the Dutch East Indies. *Cocoa:* Tests of the Okadierung process for the refermentation of cacao beans that had not been properly fermented in the country of production indicated that the process could improve colour but not flavour. *Oils and fats:* Results of a chemical and physical analysis of dhupa nuts (*Vateria indica*) are compared with those of tengkawang nuts (*Shorea* sp.). Both contain an edible fat, the properties of which are very similar; the fat content of the *Shorea* nut is at least 50%, whereas that of the *Vateria* nut is only 24%. The press-cake of the *Vateria* nut has a low protein content and can be used for manure but not cattle feed. A comparison is made of the oils of the physic nut (*Jatropha curcas*) and the castor bean (*Ricinus communis*). *Jatropha* seeds have a lower oil content and the oil is only suitable for soap manufacture. *Pests:* The flat grain beetle (*Laemophloeus* sp.) and psocids were found on cocoa beans imported from Nigeria; these insects are considered to be of minor importance and probably fed on moulds growing on the cocoa. The coffee bean beetle (*Araecerus fasciculatus*), a very dangerous pest, was found on cocoa beans imported from Sierra Leone; information is given on its biology and damage, and control measures with low temperature treatment or hydrocyanic acid are discussed. *Tobacco:* The composition of flue-cured Virginia tobacco from the Celebes, the U.S. and Holland is compared. The results from the Dutch tobacco were promising. *Coconuts:* Mention is made of the incidence of suncracking in coconuts exported from Surinam.

4521. BARBADOS.
Annual Report of the Department of Science and Agriculture, Barbados, for 1950-51, Bridgetown, pp. 68.

Sugar cane breeding: The outstanding varieties tested during the year included B.41211, B.41227, B.45151, B.46233, B.46397, B.47419 and B.4744. Details of the trials and of new crosses made and seedlings raised are available in the Annual Report of the B.W.I. Central Sugar Cane Breeding Station. *Botany:* This section was mainly occupied with the propagation and distribution of selected strains of ornamentals, vegetable seeds, citrus and tropical fruit trees. *Chemistry:* In fertilizer trials on cane early potash applications were again found beneficial, and once more there was no significant response to phosphates. *Entomology:* Biological control of the stem borer of sugar cane, *Diatraea saccharalis*, by the parasite *Trichogramma minutum*, has been successfully maintained. The increase in damage due to the root borer *Diaprepes abbreviatus* has been energetically countered and preliminary experiments with aldrin have shown good promise.

4522. BERMUDA.
Report of the Bermuda Department of Agriculture for 1951, 1952, pp. 31.

Vegetables: Results of the second season's cropping of a 5-year manurial trial show that plots receiving a 4–12–6 application again gave the highest yields of potatoes and rutabagas, and that castor pomace gave the highest yields of cabbages and carrots. *Bananas:* Fertilizer experiments have been started. *Pest and disease* incidence on crops is noted.

4523. BRITISH COLUMBIA.
46th Annual Report of the Department of Agriculture, British Columbia, 1951, 1952, pp. 193.

Items of horticultural interest include: *Agricultural statistics:* The winter of 1949-50 was considered the coldest in 50 years, causing severe damage to fruit trees and reducing subsequent yields. *Horticulture:* Notes are given on successful application of sawdust mulch to rooted azalea and rhododendron cuttings, tulips and daffodils, strawberries and other soft fruits. Work is reported on hardy seedling apricots, hardy intermediate apple stocks, spray applications for blossom thinning and fruit retention, and mineral deficiencies of fruit trees. Concentrate-sprayers generally used for insect control have proved effective in the control of apple scab. *Plant pathology:* Blossom sprays with bordeaux and Dithane Z78 appear to offer some promise for control of fire-blight of pears. For the control of white-pine blister-rust on black currants wettable sulphur was more effective than any other fungicide tested.

4524. CANADA.
Annual Report Fruit and Vegetable Products Research Committee, Department of Agriculture 1950, pp. unnumbered [received 1952].

This contains brief reports from various centres on storage (pre-storage factors; harvesting, grading and packing; storage environment; pathological studies; equipment design) and on processed foods. Items of direct horticultural interest are (1) the relationship of McIntosh and Spy apple storage quality to fertilizer practice; (2) the influence of orchard nutrition on the keeping qualities of Cortland apples; (3) apple variety storage trials in which those tested had the following storage life: Newtosh (3 months), Linda (2 months), Edgar (90 days), Bancroft (160 days), 0-2016 (160 days) and Lewfam (110 days); (4) storage trials of McIntosh grown on rootstocks E.M. I, II, IX and XII, Anis, Antonovka and *Malus baccata*, which showed that those grown on E.M. I were very susceptible and those on E.M. II, Antonovka and *M. baccata* were moderately susceptible to core flush, those on E.M. IX and XII and Antonovka were more liable to fungal rots, and those on Antonovka and E.M. XII were very susceptible to senile breakdown; (5) and (6) storage qualities of McIntosh in and near the Okanagan Valley in 1950, and with pre-harvest sprays of 1-naphthaleneacetic acid; (7) bruising trials of McIntosh grown on *Malus robusta*; (8) keeping qualities of McIntosh picked before and after maturity; and (9) cool storage of tulip bulbs for early blooming.

4525. CEYLON. (JOACHIM, A. W. R.)
Administration Report of the Director of Agriculture for 1950, Part IV Education, Science and Art (C), 1951, pp. 168, Rs. 3.35.

Tea Research Institute. The economic control of blister blight was the main problem. Large-scale experiments

proved that tea recovering from pruning and tea in plucking during the severe, south-west monsoon period can be effectively and economically protected by spraying at regular intervals with a copper fungicide. Experiments with copper-containing dusts do not yet show conclusive results. NPK experiments clearly showed the ill effects of lack of K. The deleterious effect of long continued fish leaf plucking became increasingly apparent. In the pruning cycle increment experiment there was for the first time a definite indication that ammonium sulphate is preferable to sodium nitrate as a source of N. *Rubber Research Institute.* Clone LCB870 again showed good resistance to *Oidium heveae.* Cross pollination with high yielding clones was carried out and the crown budding experiments begun in 1949 were continued. *Coconut Research Institute.* The breeding of the eulophid parasite, *Trichospilus pupivora,* for the control of the coconut caterpillar, *Nephantis serinopa,* was continued and some seven million were liberated on various estates. Artificial pollination with a view to transferring desirable characters from tall to dwarf palms continued. At Bandirippuwa factorial manuring experiments confirmed the negative interaction between potash and nitrogen; the K content of coconut water showed close correlation with copra yield and total available K in the soil. Tapering disease is now definitely considered to be due to malnutrition or metabolic disturbance; Mg may be the fourth major element in coconut nutrition. *Agricultural Research Divisions. Shallots.* The planting of bigger cloves gave yield increases of 20-30% but had little effect on grades. 20 lb. N as ammonium sulphate per acre gave a yield increase of 26% over the control, but 40 lb. did not raise the yield further. *Mango.* Many sour and fibrous mangoes were top worked to good varieties by a technique which avoids pruning or cutting of the old variety until the better one is established. *Cacao.* A cheap and simple method of propagation from leaf and stem cuttings was developed and is being employed for multiplying desirable clones. A satisfactory budding method, a modification of the usual patch type, was also evolved. *Lime.* The Tahiti lime, formerly propagated by budding, can now be easily propagated by cuttings in the ICTA and other simple, cloth-covered propagators. *Tobacco.* Adding 4 lb. borax per acre mixed with the usual fertilizers applied 10 days after planting resulted in little or no leaf spot disease appearing, early and more even leaf ripening, brighter leaf of better quality, and easier curing.

4526. CEYLON.
Annual Report of the Coconut Research Scheme for 1949, 1951, pp. 42, Re. 1.

In a 3-level NPK experiment which has been carried on for 14 years, N had a depressing effect on yield after the 10th year and this has been maintained. P has never given any response and K has had the most significant effect. Work is also reported on nutrition, soil studies, coconut products, selection and progeny testing and methods of improving seed germination.

4527. COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, AUSTRALIA.
Third Annual Report for the year ending 30 June, 1951, Canberra, 1951, pp. 167, 9s. 6d.

The following sections are of horticultural interest: *III. Plants. 2. Plant Introductions.* Trials were carried out with *Lathyrus ochrus* as a green manure plant, sunflower, safflower, *Rumex hymenosepalus* as a source of tannins, and *Hibiscus cannabinus. 4. Plant Diseases.* Brown rot of stone fruits and seedling blight of peas were investigated. *5. Fruit Investigations.* At Stanthorpe, Qd, apple and pear rootstock trials were continued. Eleven new woolly-aphis-immune Malling stocks budded to Jonathan were tested against Northern Spy. Studies indicate that an accumulation of arsenic in the soil from sprays is unlikely to be responsible for the difficulty encountered in re-establishing trees on old orchard land. Apple seedlings failed to grow normally in soil infested with the nematode *Pratylenchus pratensis.* In Tasmania size of crop and fruits was found to be the chief factor affecting the incidence of disorders in stored apples. The behaviour of several varieties under gas storage is being investigated. *6. Drug Plants.* Work on *Papaver somniferum* and *Duboisia* spp. continued. *7. Tobacco.* Studies were made on water requirements, the yellow dwarf and big bud virus diseases and methods of growing seedlings all the year round. *8. Plant Physiology.* Tobacco studies at Canberra were concerned with the effects of soil moisture and drought on growth, the relationship between leaf shape and ageing, stimulation and inhibition of bud growth. *18. Weed control.* Work included control of *Chondrilla juncea, Rubus fruticosus, Rosa rubiginosa* and mintweed, and investigation of the herbicidal properties of oils, of oil emulsions fortified with PCP, and of TCA.
IV. Irrigation. 2. At *Merbein, Victoria,* work included irrigation, soil preservation and reclamation studies, disease control in vines and vegetables, sultana vine yields, weed control, soil salinity, green manuring, plant nutrients and fruit processing. *3.* At *Griffith, N.S.W.,* work included irrigation, drainage and soil structure studies, salt injury and frost control in citrus orchards, reconditioning of old orchard land, vegetable nutrition, soil fertility and plant water relations.
VI. Nutrition. 7. Biochemical studies of the disordered metabolism in zinc- and copper-deficient plants. 8. Minor elements in nutrition.
IX. Entomology. 5. Biological Control of St. John's Wort, cabbage moth, cabbage butterfly, green vegetable bug, red scale, Queensland fruit fly, the weed *Heliotropium europaeum,* and red spider. *8. Control of cockchafers* causing eucalypt defoliation and damage to turf. *10. Insects and Viruses.* Further studies on the physiology of virus vectors and the transmission of plant viruses.
XII. Food. 2. Physics of transport and preservation. The water relations of dried fruit, evaporation from stored fruit, freeze drying and cool storage of fruit were studied. *3. Food Chemistry.* Anaerobic destruction of ascorbic acid, natural coating of apples, volatile products of apples and chemical reactions in processed food were studied. *4. Microbiology of foods.* Work included investigation of rots caused by *Gloeosporium album,* the action of *Sclerotinia sclerotiorum* toxin on carrot tissue, and penicillium rot in oranges. *8 and 9. Fresh fruit and vegetable storage and transport.* Subjects studied were salt accumulation in relation to respiration, N metabolism and the maturation period in apples, the rise in respiration rates in apples and bananas on

ripening, storage qualities of various fruits, brown rot in apricots and peaches, destruction of Queensland fruit fly eggs and larvae, and papaw ripening. Studies were also made on *10. Canning and fruit products*, *11. Dried foods* (vegetables and fruit), *12. Frozen fruits and vegetables*, and *13. Dried grapes.*

4528. CORNELL.
64th Annual Report Cornell University Agricultural Experiment Station for the year 1950-51, 1952, pp. 67-119.

The following research projects of horticultural interest were among those under way in the various departments. *Agricultural economics:* Fruit and vegetable marketing. *Agricultural engineering:* Fertilizer placement for vegetable crops; mechanical equipment for pest, disease and weed control. *Botany:* Iris investigations; physiology, nutrition and development of peppermint. *Entomology:* Sprays and dusts for apple insects; insect pests of nursery crops; soil treatments with BHC, lindane and chlordane and their effects on the flavour of vegetables. *Floriculture and ornamental horticulture:* Effects of daylength on orchids, tuberous begonias and violets; methods of watering greenhouse roses and other flowers; flower storage; weed control among flowers and in turf. *Plant breeding:* Cytogenetic studies on *Nicotiana*; potato, cabbage, celery, bean, onion, melon and cucumber breeding. *Plant pathology*: Various diseases of potatoes; control of brown rot of stone fruits; diseases of roses; tomato root rot; cucumber mosaic virus in peppers and celery. *Pomology:* Effects of fertilization, pruning, spraying and fruit thinning on various fruit trees; cold hardiness of woody tissue of fruit plants; apple storage studies. *Vegetable crops:* Fertilizer requirements of vegetables; variety trials; weed control; irrigation trials; potato storage studies.

4529. D.S.I.R., LONDON.
Food Investigation 1950, being *Report of the Food Investigation Board with the Report of the Director of Food Investigation for the year 1950*, 1952, pp. 44, H.M. Stationery Office, Lond., 1s. 6d.

A comprehensive, but highly condensed, report is given on work in progress at the various stations and laboratories of the D.S.I.R., the following being of horticultural interest. *Low Temperature Research Station and Smithfield Laboratory:* Work in Jamaica on the refrigerated gas storage of bananas has shown that the acceleration of ripening throughout the bulk of the fruit in the store could be prevented by adding ozone to the storage atmosphere. *Ditton and Covent Garden Laboratories:* Methods of identifying and estimating aliphatic alcohols, carboxylic esters and carbonyl compounds, believed to emanate from apples, are being investigated. Of the 22 varieties of dessert apples tested Tydeman's Late Orange, Winston, Barnack Beauty, Belle de Boskoop, and D'Arcy Spice have been kept in good condition with little wastage at a storage temperature of 2·8° C. (37° F.) until March, and can be recommended from the point of view of their storage behaviour. A 4-year survey of the rate of respiration of Cox's Orange Pippin apples has been concluded, and preliminary investigations on short-term exposure of plums and apples to high concentrations of CO_2 have been made. The effect on the internal atmosphere of Cox's Orange Pippin of 20 new types of skin coating have been measured. Oil water emulsions containing phenyl mercuric chloride again reduced rotting in stored apples. The storage of broccoli, spinach, lettuce and celery has been investigated. Results obtained from storage in wooden bins in a brick-built potato store indicated, that unless ventilating ducts are provided under the potatoes, loading to a height greater than about 6 ft. leads to excessive scatter between temperatures at different levels in the bin, but this scatter can be reduced by using slatted instead of closely boarded bins. Investigations on the CO_2 content of the potato tuber during storage have shown that no significant change precedes sprouting; following sprouting there is an increase in the content of CO_2, the extent of which is directly correlated with the size of the sprouts.

4530. EAST AFRICA.
Annual Report East African Agriculture and Forestry Research Organization, 1951, pp. 88.

Research work: *Cloves.* There is strong evidence that a new species of the fungus *Valsa* is the cause of sudden-death. There are indications that only mature trees can be attacked. *Cryptosporella* sp.nov., a fungal wound parasite, has been shown during the year to be the cause of the dieback disease. Its pathogenicity has been proved and every form of the disease reproduced experimentally. All observed deaths of young trees in the sudden-death manner were due to *Cryptosporella*, for which control measures have been successfully applied on a plantation scale. *Coconuts.* Yields in Zanzibar, Pemba and the mainland prove to be controlled largely by the incidence of 2-3 species of *Theraptus*, a coreid bug, which is the cause of the gumming disease. Good, sound crops are produced where palms are colonized by *Oecophylla longinoda*, but this ant is preyed upon and often eliminated by other ants. *Sweet potatoes.* In a fertilizer experiment no appreciable response was shown to phosphate.

4531. F.A.O.
Yearbook of food and agricultural statistics, 1951, Vol. 5, Part 2, Trade, [English, French and Spanish], pp. 236, $3.50 or 17s. 6d.

Trade statistics in food and agricultural commodities are presented for 1950, together with the latest revised data for 1947, 1948 and 1949, and are compared with the prewar (1934-38) average. Commodities are grouped in sections, those of interest to horticulturists being sugar; potatoes; dry legumes; onions; fruit; oilseeds and oilseed cake; vegetable oils; coffee, tea, cocoa and spices; beverages (wine) and tobacco; fibres and rubber.

4532. GEORGIA.
Serving Georgia through Research, being *63rd Annual Report of the Georgia Experiment Station, 1950-51*, pp. 76, illus.

Entomology: Dust applications of aldrin, parathion, chlordane and lindane gave over 90% control of vegetable weevil [*Listroderes obliquus*] attacking a number of vegetables, tobacco and some flowers. The parasite

Hyalomyodes triangulifera, in the larval stage, was found to parasitize about 19% of the weevil adults. A mixture of 1 to 2 pt. of 25% emulsified DDD (rhothane) concentrate (or 2 lb. of 50% wettable DDD powder), ½ pt. of 40% TEPP (or 1 lb. of 15% wettable parathion powder) and 30 to 50 gal. water was very effective for eliminating all important tobacco insects encountered in 1950. *Horticulture:* Winter grazing in pecan orchards was found beneficial for nut production. The average yield for 4 harvests of muscadine grapes shows that plots with winter cover of rye and vetch and clean summer cultivation produced 46% more fruit than those with permanent cover or volunteer weeds and grass with occasional mowing. Foliage application of ethylene chloride in August advanced the blooming date of cyclamen by about a month. Snapdragons responded to Fe and Mg. Mixtures of various proportions of peat, sand and sawdust were found very satisfactory rooting media for camellias. *Plant pathology:* Spray and dust recommendations are made for the control of blue mould on tobacco.

4533. Hawaiian Sugar Planters' Association. ***Report of the Experiment Station Committee for the year ending Sept. 30, 1951,*** 1951, pp. 74, illus.

Cultural practices. Advances were made towards commercial control of tasseling by night lighting; 16 small applications of α-naphthalene acetic acid and one large application of maleic hydrazide both reduced flowering to 20% of the controls. Radioactive studies included placement of phosphate with setts, foliar application of sucrose, phosphate fertilization by air, and distribution of P and N through the plant. Experiments on the effect of climate on N utilization indicated that the gradient of soluble N from base to top is a direct indicator of N demand by the plant. Response to air-applied K_2O at 19 lb. per acre exceeded that of soil-applied K_2O at 200 lb. in most plots; preliminary data regarding foliar fertilization with urea showed that small amounts of air-applied N are just as effective as larger soil-applied doses. Ca appeared to be an essential element for cane. Research showed that new roots are far more efficient than old in absorbing nutrients and that under suitable conditions good root systems well supplied with secondaries develop to a depth of several feet. Improvement of soil texture and fertility by the application of bagasse and trash is becoming standard practice. Further crop-logging experiments are designed to define critical nutrient levels at different growth stages. A pressure-membrane technique gives a satisfactory measure of the permanent wilting point of most Hawaiian cane soils. Nylon blocks show great promise as a means of recording soil moisture; they are sensitive to both wet and dry ranges while plaster of Paris blocks are not sensitive in wet soils. Poor growth has been correlated with the puddled soil conditions often induced by harvesting with heavy equipment during wet weather; penetrometer studies and soil moisture data are now used to select fields for harvesting under such conditions. *Diseases.* Studies are reported on Fiji disease in Samoa, the correlation of leaf freckle incidence with low fertility, the successful control of pythium rot with Phygon, the effects of 2,4-D, CADE and CADE plus 2,4-D on nitrate N formation and soil organisms, and germination tests. *Machinery.* A side-mounted cutter-windrower for irrigated and unirrigated cane and a direct-mounted cutter-windrower for unirrigated cane are described. A direct-mounted cutter-loader for irrigated cane has been designed. An experimental suction drum leaf and trash separator gave 30 tons net cane per hour under best conditions, but under certain circumstances the holes tended to clog; trash extracted with cane harvested by standard equipment averaged 65%. *Varieties.* The breeding collection of some 60 canes includes, in addition to those of local origin, varieties from Barbados, Coimbatore, Florida, Demerara, Formosa, Mauritius, Java, Australia, New Guinea, Burma and Central Africa. The possibility of breeding light- or non-tasseling varieties is discussed and a review is given of the seedling performance in 1951 of 9 varieties compared with that of the standard 37-1933. *Weather.* In a temperature study an increase of 2% in sugar was obtained with each 1° F. increase, provided flowering did not take place. *Weed control.* In 2 plantations CADE has entirely replaced 2,4-D and is the only herbicide used; 4 or 5 treatments are generally all that is necessary before the cane "closes in". A "yellow CADE", using substitute oils (because of the heavy demands for diesel oil) is being developed. An improved formulation of the combined emulsifying and wetting agent, 2-7-R, is used extensively. E50 is a very satisfactory emulsifying agent for the manufacture of duplex CADE for use in wet country with a rank weed and grass growth. CMU is proving an outstanding herbicide both for pre-emergence control and, in heavier applications, as a soil sterilant. Tests with 2,4-D pellets continued to give satisfactory results. Tests were made with SES, MCP, CADE plus SSA and TCA. *Miscellaneous.* The rat poison, Warfarin (Compound 42) is rapidly gaining in popularity.

4534. Indian Central Tobacco Committee. ***Sixth Annual Report Indian Central Tobacco Cttee 1950-51,*** Madras, 1952, pp. 74, illus.

The research programme on flue-cured, cheroot, wrapper, Bidi, chewing, hookah and rustica tobaccos continued at several stations. The subjects of investigation were spacing, planting date, topping, manuring, irrigation, rotations, trials of new varieties and suppression of axillary buds after topping. In new variety trials Chatham appeared to be better in quality, more suitable for topping and higher-yielding than Harrison Special, the main variety of flue-cured tobacco. It is proposed to set up one Central Research Station at Rajahmandry with 4 subsidiary stations elsewhere.

4535. Iowa. **New Findings for Farm Folk,** being ***A Report of the Iowa Agricultural Experiment Station for the Two Years, July 1, 1949 to June 30, 1951,*** Part I, 1952, pp. 74, illus.

In this new type of report from Iowa the following work of horticultural interest is described: *Fruits and vegetables:* Disease susceptibility trials on seedling potatoes were found valuable for speeding up breeding work. The first late blight forecast made in 1950 was 100% accurate. Sulphur treatment, by reducing scab infection, has increased yields of marketable potatoes

by almost 50% over untreated controls. The raising of tomatoes from hybrid seed is considered economical for both commercial and home production. *Prunus tomentosa* appears to be as good an indicator plant for virus diseases of stone fruits as sour cherry and can be readily propagated from seed. Dwarf apple trees produced by the use of a stem piece of Clark dwarf on Virginia Crab are becoming very popular. Recent experiments have shown that purified DDT is not harmful to muskmelon and squash and is very effective in protecting these plants from certain insect pests.

4536. I.R.S.I.A. Belgium.
Rapport Annuel de l'Institut pour l'Encouragement de la Recherche scientifique dans l'Industrie et l'Agriculture, Exercice 1951. **(Annual Report of the Institute for the Encouragement of Scientific Research in Industry and Agriculture, 1951.)** I.R.S.I.A. Brussels, 1951, pp. 193.

In this administrative report the research programmes subsidized by the Institute are summarized. They include investigations on soils, palm oil and its preparation, the growing of vegetables for canning, plant hormones, potatoes, antiparasitic chemical sprays, vine-growing, hops and fruit-growing.

4537. John Innes.
42nd Annual Report of John Innes Horticultural Institution 1951, 1952, pp. 51, 3s.

Director's report: Outdoor collections of particular genera are being made. The planting of the national rose species collection and the subsidiary collection of rootstock varieties was completed. *Pomology Department:* Notes are given on tomato breeding, pear scab, potatoes, fruit cytology, resynthesis of the swede, cyto-ecology and fruit-breeding. *Genetics Department:* Studies took place on breeding systems in various families, tomato breeding, interspecific relations in antirrhinum, and flower pigments. *Cytology Department:* The chemical breakage of chromosomes was studied and also abnormal meiosis and bud sports in chrysanthemum. Cytological checking of the rose species collection and the cytological survey of garden roses continued. *Garden Department:* Basic requirements can now be formulated for the highest standard of efficiency in glass house cultivation, a standard that involves the reduction of time, labour and materials to the minimum compatible with maximum growth rate and yield. The results are described of compost studies and of work on steam sterilization of soil, tomato raising, natural and artificial illumination and glasshouse design.

4538. "De Lange Ossekampen", Wageningen.
Jaarverslag 1949, Centrale Bemestingsproefveld voor de Fruitteelt "De Lange Ossekampen", Wageningen. **(A.R. "De Lange Ossekampen", Central Manurial Trial Ground for Fruit Culture, Wageningen, for 1949),** pp. 78, illus. [received 1952].

Observations on work and fertilizer effects in the old and new orchards are followed by a progress report of the manurial trials on the experimental plots. The results showed that Ca played a dominant part in apple and pear manuring, the heaviest applications producing unfavourable responses. Reducing the amounts of K was not detrimental, but the need fo heavier dressings of N was confirmed. The effect of was not clear but increase in P appeared to improv leaf colour in Cox.

4539. Lawes Agricultural Trust (Rothamsted).
Report of Rothamsted Experimental Station for 1951, Harpenden, 1952, pp. 212, 7s. 6d.

Among the investigations described, the following ar of horticultural interest: *Chemistry Department:* Granu lated PK fertilizer placed beside pea and bean seed gav higher yields than broadcasting. *Plant Patholog Department:* Various manurial treatments had n significant effect on the spread of leaf roll virus, bu dung significantly increased the spread of potato virus Y Preliminary tests suggested that, in addition to *Myzu persicae* and *Brevicoryne brassicae*, cauliflower mosai virus could be transmitted by 6 other aphids, an cabbage black ringspot virus by 3 others. Whethe these other species play any part in spreading the viruse in field crops is unknown. Weekly sprayings of cauliflower seed-bed with DDT, parathion and Isopesto did not significantly reduce the incidence of cauliflowe mosaic. Contrary to suggestions of American worker no evidence was obtained that mushroom mumm disease is of virus origin. The cause remains undete mined, but seems more likely to be some agent preser in the soil that is not perpetuated within the mushroo mycelium. *Biochemistry Department:* Factors influen cing the infectivity of a tobacco-necrosis virus wer studied, with particular attention to the condition under which loss of activity occurs during a few days storage at 4° C. *Insecticides and Fungicides Department* Spring-sown field beans were sprayed very soon afte *Aphis fabae* infestation was first recorded with 0·02% parathion, 0·1% nicotine, 0·05% Isopestox, 0·05% pyrethrum and 0·1% DDT at the rate of 150-166 ga per acre. All the treatments reduced the aphi population directly after application, and this reductio was maintained to a greater or lesser degree unt harvest time, resulting in considerable yield increase A review of work on manganese oxidation in highe plants is included in this report.

4540. Long Ashton.
Annual Report of the Agricultural and Horticultural Research Station, Long Ashton, Bristol, 1951, 1952, pp. 210, illus.

The report follows the lines established in previou years and in addition to a general survey by the Directo contains individual papers relating to work o pomology, plant nutrition, plant pathology, cider an fruit juices and the preservation of fruit and vegetable [Abstracts of these papers are given in the relevan sections.]

4541. Massachusetts.
Annual Report of Massachusetts Agricultural Experiment Station for year ending June 1951, Amherst, 1951, pp. 62, being *Bull.* 466.

The report includes the following items: *Botany* Methods of clubroot control of crucifers and othe soilborne diseases of plants; the effect of fluorescen sun lamps on plants; promising fungicides in appl

disease control; chemicals for the control of carnation wilt diseases; tobacco frenching; the effects of mineral deficiencies on active absorption by plants. *The Cranberry Station* at East Wareham reports on frost forecasting, use of liquid fertilizer, and pest and bog-weed control. *Entomology:* Plum curculio on apples controlled by methoxychlor and cabbage maggot by chlorinated hydrocarbon insecticides. *Floriculture:* The control of red spider mites on sweet peas with systemics. *Horticulture:* Weed control in nurseries. *Olericulture:* Hormones on trellis tomatoes; breeding sweet corn, peppers and field tomatoes. *Pomology:* Nutrition of apple trees; correction of Mg deficiency in cultivated blueberries; apple storage.

4542. Ministry of Agriculture, Northern Ireland.
The Research and Experimental Record of the Ministry of Agriculture, Northern Ireland, 1951, H.M. Stationery Office, Belfast, 1952, pp. 136, 5s.

Plant Pathology Division 1950: Inoculation tests showed no close connection between the flax and the potato species of *Phoma*. The influence of soil moisture, temperature and acidity, spore load, lime content and light intensity on infection of crucifers by club root disease was studied. Cineraria rust (*Coleosporium senecionis*) and witches' broom of wallflower, not previously found in Northern Ireland, were observed. *Potato Trials 1950:* In yield trials Arran Banner came first, followed by Stormont Dawn and then by Ulster Supreme, which was tested this year for the first time. In manurial trials with 1 : 4 : 1 mixture in addition to 15 tons F.Y.M. per acre, 9 cwt. gave a yield increase of 15¾ cwt. per acre over 6 cwt., but 12 cwt. did not give a further significant increase.

4543. Mont-Calme, Lausanne.
Rapport d'activité 1932-1950, Station Fédérale d'Essais et de Contrôle de Semences, Mont-Calme, Lausanne. **(Report of the Federal Research and Seed Control Station, Mont-Calme, Lausanne, for 1932-1950.)**
Landw. Jb. Schweiz, 1952, **1**(n.s.): 17-97.

The work of this station is mainly with cereal and forage crops. The report from the Seed Control Section, however, gives the results of seed testing (for purity and % germination) of a wide range of seeds including some oil seeds and vegetables, and a report on the Swiss seed industry. The report from the Potato Section contains information on tuber testing for virus diseases, a note on a physiological rolling of potato leaves thought to be due to excessive organic matter, and mention of the negative results of an experiment to determine whether haulm destruction intensified discoloration of tubers.

4544. Mushroom Research Association, Ltd., Yaxley.
Report of the Mushroom Research Station, Yaxley, Peterborough, for year 1951, 1952, pp. 58, illus., 5s.

Cropping experiments. Doubling the quantity of superphosphate used in synthetic compost gave a very small increase in yield, particularly towards the end of the crop. Beds cased 21 days after spawning gave a much better yield than those cased earlier. It was confirmed that casing soil with too high a pH is undesirable. Casing with the coarse fractions of a soil gave an earlier and heavier crop than casing with the fine or mixed fractions. It was found that barley straw could be used to replace half of the wheat straw in synthetic compost but could not safely be used alone because it became too soft after composting. Preliminary experiments on the effects of stack moisture and firmness are described, but no conclusions can yet be drawn. It was found that urea was at least as good as dried blood for synthetic composts, and that gypsum and superphosphate could be added equally well at filling, as at the last turn. *Chemistry Department.* N changes in composts made with urea and dried blood were compared. Tests showed that spent M.R.A. synthetic compost compared favourably in manurial value with farmyard manure. Compost made with dried blood had a higher N content at the end of the season than that made with urea. *Casing soil.* Presence of mycelium increased the aggregation of several types of casing soil and their stability to water. The greater the amount of water applied at each watering, the greater was the breakdown of soil structure; disintegration reached a maximum when the quantity of water applied at one time reached about 16% of the weight of dry soil. Soils soaked with 5% sodium silicate showed a greater water stability than soils soaked with water or with an anionic detergent. *Soil moisture requirements.* It was not found possible to define an optimum moisture range for casing soils, but drying out to plant wilting point considerably reduced the yield. *Microbiology Department.* In a trial on a commercial nursery treatment of the compost with copper sulphate (½ lb. per ton) at filling controlled truffle. Satisfactory control of bacterial pit was not obtained with any substances tested. Zineb and tetramethyl thiuram disulphide both gave significantly better control of bubble (*Mycogone perniciosa*) than did bordeaux mixture. *Synthetic compost.* A report is given by Noble Mushrooms Ltd. on their experience with the use of M.R.A. synthetic compost under commercial conditions. Their results have shown it to be a commercial proposition. A note is given on the straw supply position and on the possibility of using other fibrous materials for composts.

4545. National Institute of Agricultural Botany.
Thirty-First Report and Accounts of the Council of the N.I.A.B. for 1949-50, Cambridge, pp. 36 [received 1952].
and
Thirty-second Report for 1951, 1952, pp. 42.

Notes are included on variety trials of early cauliflower, broccoli, brussels sprouts, spring and winter cabbage, onions and potatoes.

4546. New Jersey.
Science and the Land, being *72nd Annual Report of the New Jersey Agricultural Experiment Station, 1950-51,* pp. 126.

Entomology: Parathion was found to be a good all-purpose insecticide for peaches, controlling plum curculio, oriental fruit moth, European red mite, two-

spotted mite and possibly scale insects. Concentrated insecticides applied by mist blowers are recommended for the control of insects and spider mites attacking nursery plants. *Horticulture:* 2,4-D (25 p.p.m.) applied to the flowers of the holly variety East Palatka, believed to be a hybrid of *Ilex opaca* and *I. cassine*, induced fruit set, though the parthenocarpic fruits so produced were smaller than those from pollinated blossoms. It is shown that germination of seeds of American holly, *I. opaca*, can be hastened by treatment either with sulphuric acid or potassium hydroxide or by watering with dextrose solution. Liquid fertilizers are recommended for greenhouse use. Results presented confirm those of earlier investigations, which have shown that urea sprays have practical value for apples but their use on peaches and almonds is still questionable. For the control of the 3 important blueberry pests, cherry fruit-worm, cranberry fruit worm and plum curculio methoxychlor spray or dust treatments are suggested. The vector of blueberry stunt, identified as the sharp-nosed blueberry leafhopper, was successfully controlled by a combination of methoxychlor and DDT applications. *Plant pathology:* The fungicide SR-406 (N-trichloromethylthiotetrahydrophthalimide), marketed under the trade name Orthocide 406, was effective against a number of diseases attacking fruit crops, vegetables, ornamental plants, and lawns.

4547. New York State.
70th Annual Report New York State Agricultural Experiment Station, 1951, 1952, pp. 26.

The following are among the 201 current research projects listed: *Entomology:* biology and control of red-banded leaf roller, apple maggot, orchard mites, codling moth, peach tree borer, grape insects, cucurbit insects and diseases, and insects infesting peas; evaluation of new insecticides and spray equipment; insect transmission of virus diseases of stone fruits. *Plant pathology:* diseases of small fruits; epidemiology and control of tomato anthracnose; control of apple scab; X-disease of stone fruits; peach leaf curl and brown rot control; development of a spray schedule for the control of cherry leaf spot on cherry and plum nursery stock. *Pomology:* breeding tree and soft fruits; cherry rootstock trials; blossom bud initiation in fruit trees; vineyard studies; nutrition of fruit trees; selection, propagation and culture of apple rootstocks; orchard management studies; handling and storage of fruit nursery stock. *Seed investigations:* abnormal germination; seed storage problems. *Vegetable crops:* tomato, sweet corn, bean and squash breeding; correction of nutritional deficiencies of vegetable canning crops; weed control in vegetables; effect of growth inhibitors on size and post-harvest sprouting of beetroots.

4548. Nyasaland Protectorate.
Report of the Department of Agriculture, Nyasaland, for 1950, Part II. Zomba, 1952, pp. 36, 5s.

Tea. The best commercial way of bringing young tea into bearing is to cut across at about 16 in. 18 months after planting out, and pluck at about 27 in. Clean-pruning was again superior to cross-cut treatment on Indian jat. In the grass and weed cover experiment only Seychelles grass reduced the yield significantly. In spacing tests at 3½ ft., 4 ft., 4½ ft. and 5 ft. square the two closest gave significantly higher yields than the widest, but showed no significant difference between each other. *Tung.* This year the yield advantage 4 clones on *A. montana* rootstock over the same clones on *A. fordii* stock was less pronounced than hitherto, possibly because the latter withstood the 1949 drought better. In clone trials ZM8 and ZM13 gave the highest yields. In a manurial trial tung cake, cotton seed and artificials have given significantly better yields over 3 years than farmyard manure and no fertilizer. The incidence of botryosphaeria die-back was much higher on B-type (short-trunked) than on A-type (long-trunked) clones; invasion chiefly occurred through the fruit stalks of the previous year's harvest. *Tobacco.* N was again the only fertilizer to show a significant increase in yield. Diseases on tobacco, tea and tung are recorded.

4549. "De Proeftuin" te Boskoop.
Jaarboek uitgegeven door de Vereniging "De Proeftuin" te Boskoop, 1951. **(Yearbook of the Society "De Proeftuin" [The Trial Garden], Boskoop, 1951),** pp. 96, illus.

The report on experimental work includes the following investigations: incidence and control of *Verticillium dahliae* in *Rosa rugosa*; control of yew beetle larvae, *Otiorrhynchus sulcatus*; control of leaf spot on *Daphne mezereum*; a determination of the optimum pH of sandy soils for tree nurseries; the value of various leaf moulds for raising ericaceous plants; trials with growth substances and soil composts for the propagation of walnuts by grafting and budding; trials with rose rootstocks; grafting trials with blue spruce (*Picea pungens glauca*); breeding and selection work with ornamental shrubs; colchicine treatment of shrubs; propagation trials in an electrically warmed frame and with artificial light; delaying flowering in chrysanthemums and roses with maleic hydrazide; and seed germination trials with holly and yew. Finally, there is a note on the economics of mechanization in Boskoop nurseries.

4550. Purdue University.
62nd Annual Report of the Agricultural Experiment Station, Lafayette, Indiana, for the year ending June 30, 1949, pp. 144, illus. [received 1952].

The following items have been taken from a report covering a wide field: *Tomatoes:* Variety trials and breeding for disease resistance and vitamin content. *Potatoes:* 2,4-D applied for weed control was found compatible with the following fungicides used in potato spraying: basic copper, bordeaux mixture, Parlate, Zerlate and Dithane D-14. *Orchard studies:* Soil management studies in peach orchards showed that sod or infrequent cultivation with mulches beneath the trees gave vigorous growth and good fruit production. Virginia crab clonal rootstocks have proved superior to French crab seedling stocks in the production of larger than average size apple fruits. *Flowers: Lilium regale* was found very sensitive to frosts in central Indiana regardless of size of bulb, depth of planting or mulching material.

4551. PURDUE UNIVERSITY.
Progress of Agricultural Research, being *63rd Annual Report of the Director, Agricultural Experiment Station, Lafayette, Indiana, for the year ending June 30, 1950,* pp. 150, illus.

Horticultural Crops: Newly-bred tomato varieties were tested for resistance to fusarium wilt and septoria disease. Among nitrogenous fertilizers tested on meadow peppermint only 100 lb. per acre of N supplied as granulated cyanamide gave a significant yield increase of oil. Golden Delicious topworked on Virginia crab (partially own rooted) made poor trees. In a test plot, the strawberry varieties Fairland, Temple, Sparkle and Marshall were found to be resistant to, or tolerant of, red stele, *Phytophthora infestans*, while Premier, Blakemore, Robinson, Tennessee Beauty and Tennessee Shipper were completely susceptible. *Tobacco:* In 3 variety trials of Burley tobacco, Ky 26 was of best quality and produced a highly satisfactory yield of 1,725 lb. per acre. *Crop chemistry:* Spraying trials to control septoria leafspot on tomatoes have shown copper fungicides to be the most effective, giving significant yield increases. Grape berry moth leaf tier, colaspis and leaf hoppers attacking grapes were successfully controlled by one spray of lead arsenate followed by one of DDT. A 50-50 mixture of D-D, applied at the rate of 25 gal. per acre 2 to 3 weeks before planting, improved the growth and nearly doubled the marketable yield of both muskmelons and sweet potatoes.

4552. SEYCHELLES.
Annual Report of the Department of Agriculture, Colony of Seychelles, for 1949, Mahé, pp. 24 [received 1952].

Notes are given on the cinnamon leaf oil and bark, patchouli oil, vanilla and tobacco industries. In incomplete experiments Agrocide 7 was fairly effective against *Melittomma insulare* on coconut. A small number of the scoliid wasp, *Scolia ruficornis*, a parasite on the larvae of the beetle *Oryctes monoceros*, a minor pest in coconut plantations, was issued to planters.

4553. SMITHERS.
Progress Report Dominion Experimental Substation, Smithers, B.C., 1938-1950, 1952, pp. 44, illus.

Vegetable and small fruit varieties suitable for cultivation under conditions encountered in this area are listed. Of tree fruits only crab apples and apple × crab hybrids have proved hardy so far, but further apple and plum varieties are being tested. A list of ornamentals grown successfully is also given. Ammonium phosphate 16-20 applied at the rate of 2-3 lb. per 100 ft. row was found to be the most effective fertilizer for vegetables, and applied at 5-6 lb. per 100 ft. row for soft fruit mulched with sawdust. Trials with plant protectors such as hot caps and hot tents [cloches] indicate that these can be used to advantage in getting early sown, tender vegetables past the late spring frosts, but they do not compensate for lack of heat with heat-loving crops.

4554. SOMALILAND.
Annual Report of the Somaliland Department of Agricultural and Veterinary Services for 1951, pp. 58.

With a view to determining which are commercially most suited to local conditions 20 varieties of date were introduced in 1950 and 1951 from Arabia and the Sudan and planted at 5 introduction stations. Local palms have also been planted.

4555. SOUTH AUSTRALIA.
Report of the Minister of Agriculture, South Australia, for the year ended 30th June 1951, 1952, pp. 56, illus.

Information is given on trends and production in the agricultural and horticultural industries. As a result of the campaign for the eradication of fruit fly one whole summer has passed without any evidence of the pest. Research activities are briefly outlined, no results being given. They include trials to test the possibility of reducing labour in pome fruit spraying, pruning (by biennial or triennial cycles) and harvesting; work on citrus storage and export; trials of automatic pruning equipment; soil conservation in orchards and vineyards; testing the possibility of apple scab infection from very late ascospore discharge; studies of gummosis in apricots; cultural, manurial and varietal trials with tomatoes and asparagus; nutrient deficiency studies with fruits.

4556. STINSON, F. A. (TOBACCO RESEARCH BOARD OF SOUTHERN RHODESIA.)
Results of experiments 1949-1951.
Bull. Tobacco Res. Bd S. Rhod. **1**, 1952, pp. 16, illus.

The Tobacco Research Board, financed jointly by the Rhodesian Tobacco Association and the Southern Rhodesia Government, assumed responsibility for tobacco research in 1950. Biennial progress bulletins are issued instead of annual reports. Experimental work has begun on fire-cured tobacco at Shamwa, on cigar tobacco at Chipinga and on Turkish tobacco at Trelawney. *Flue-cured Tobacco. Seedling Production.* Nursery control of eelworm was obtained by injecting either 3 c.c. of W.40 or 8 c.c. of DD at 9-in. depths and 15-in. intervals over beds and paths. Burning piled fine brushwood on the beds effectively reduced weed growth. Vermiculite mixed with the top 2 in. of vlei and sandveld beds at ⅓ cu. ft. per sq. yd. reduced the number of waterings required and produced seedlings with more fibrous roots. Virginia B (3-13-9) fertilizer at ⅔ lb. per sq. yd. of seed bed on vlei gave good results. Overwatering sometimes caused etiolation; if the condition did not clear up when watering was reduced, applications of sodium nitrate at 1 lb. per 30 sq. yd. hastened growth. Damping off was minimized by spacing plants not closer than 1½ by 1½ in. *Crop Rotations.* Perennial grasses grown for 3 years have been followed by good tobacco provided the grass ley was ploughed in before the end of the rains prior to planting the tobacco. *Cultural Practices.* A satisfactory spacing was 24 × 42 in. Early topping when 10% of the plants were in flower was found more satisfactory than later topping. *Storage.* The chances of barn rot were found to be minimized by not reaping leaf that is green, avoiding damage during reaping and tying, filling each barn with leaf of uniform type and maturity, avoiding overcrowding in the barn, not introducing extra moisture unless necessary, and increasing the temperature by 5° F. each hour after colouring, while giving plenty of ventilation. *Varieties.*

White Stem Orinoco, Yellow Mammoth and Bonanza have yielded above average at Trelawney, Bonanza outyielding the other 2 on light soils. Virginia Bright has yielded relatively well at Karoi. White Stem Orinoco, Virginia Bright and C7 have produced almost equally high quality at Karoi. Delcrest tested in 1950-51 for the first time gave high quality leaf at both Stations. A list of active projects on flue-cured, Turkish fire-cured and cigar tobacco is given.

4557. Tea Research Institute of East Africa.
Annual Report of the Tea Research Institute of East Africa, 1951, 1952, pp. 33.

Agricultural Department. A factorial experiment was started at Kericho and 2 places in Tanganyika to study responses to N, P, K, S and a Napier grass mulch. In the results for the first year from pruning yield showed no significant differences from control with 5 treatments consisting of 40 lb. N, 20 lb. P_2O_5, 20 lb. K_2O, 50 lb. S and 20 tons mulch per acre, with grevillea shade present. A study of the shade problem in vegetative reproduction was begun. An experiment in the Kericho area of planting out 10-week-old cuttings before the roots emerged was unsuccessful. The 18-month-old cuttings planted out experimentally in 1950 showed only 5% loss after their first dry season. The germinating capacity of seed fumigated with methyl bromide was found to be nil as compared with 67% in the control. The best method of using triphenyl tetrazolium bromide (Grodex) for testing the potential viability of tea seed is being sought. *Chemical Department.* A study of the alkaline soils of hut sites gave little hope of economic treatment of areas where the high pH persists into the subsoil. The variations with season of the polyphenol content and the fermenting activity of tea leaf are being studied.

4558. Trinidad and Tobago.
Administration Report of the Director of Agriculture, Trinidad and Tobago, for 1950, 1952, pp. 38, 48c.

Cacao: Excision and burying of infective tissue at the 2 peak periods remains the only satisfactory means of keeping down infection of witches' broom. *Sugar Cane:* Control of froghopper with chlorinated hydrocarbon insecticides was highly effective. The Cuban fly (*Lixophaga diatraeae*) and the Amazon fly (*Metagonistylum minense*), parasites of the borer *Diatraea,* were liberated locally. *Citrus:* Evidence suggests that epidemic die-back may be a root disease specific to West Indian limes and may be avoided by budding on immune rootstocks. In a cover crop trial trees on grass plots had sparse yellowed foliage symptomatic of N deficiency, while those on leguminous plots had dense green foliage. *Coconut: Aspidiotus* was effectively controlled by commercial spraying with oil emulsions.

4559. U.P.A.S.I.
Annual Administration Report, United Planters' Association of Southern India, Tea Scientific Section, for 1950-51, 1951, pp. 30.

Helopeltis. Helopeltis has ceased to be of much concern as dusting with 4% DDT has proved eminently satisfactory and has become more or less routine practice. *Blister Blight.* Continued to be the major leaf disease. Perenox at 4 oz. in 10 gal. of water was the most efficient of 5 fungicides tried. British Schering at 2 oz. (the only concentration used) and Perenox at 2 oz. were both equally efficient and almost as good as Perenox at 4 oz. The treatments had no significant effect on yields. *Defoliation.* In the NPK trial the plant food content was always less in samples from defoliating bushes, and both healthy and defoliating bushes generally showed progressively higher plant food content in the manured plot than in the control. *Fertilizer Trials.* As previously N at 80 lb. per acre (but not at 40 lb.) gave significantly increased yields. K at 20 and 40 lb. both increased yield significantly. Two other NPK trials, an N trial and an NCa trial yielded no significant results. In a high range NPK trial at 4 places there has been a definite response to manuring especially with N, at 3 out of 4 places in 3 out of 4 years. *Cultivation.* Differences between forking, trenching and no cultivation were insignificant. *Demossing:* Caustic soda at 2% was better than any other wash tried. *Bud Break.* The trial gave inconclusive results. *Other work.* Reference is made to diseases of coffee, cardamoms and *Erythrina lithosperma.*

4560. U.S. Department of Agriculture.
Agricultural statistics 1951.
Supt. Documents, U.S. Govt. Printing Office, Washington 25, 1951, pp. 742, $1.75.

A wealth of information is provided on acreages, yields, utilization, values and consumption of crops of all types in the U.S.A. between 1945 and 1950 and in many cases for the past 12 and even 22 years. Summaries of world production and of foreign trade are given among others for citrus, the major deciduous fruits, sugar and tobacco. Animal statistics are dealt with in equal detail.

4561. U.S. Department of Agriculture (Trullinger, R. W.).
Report on the Agricultural Experiment Stations 1951, 1952, pp. 170.

The more important research projects of the Federal Stations are summarized. *Fruits:* In New York State spraying the foliage of apples with urea was found to give better control of N supply than soil applications of nutrient solutions. Minor element and NPK trials were conducted. In Missouri hay mulching proved better than sod culture in apple orchards. In West Virginia 2,4,5-trichlorophenoxypropionic acid (2,4,5-TP) was found effective in experiments to control preharvest drop of apples. An electrostatic dusting appliance was tested; an electric charge as the particles left the nozzle gave 5-10 times better coverage than ordinary procedures. *Vegetables:* Onion studies included fertilizer placement and the best position of the bulb in the soil for seed production. A cheap synthetic compost was developed in Pennsylvania as a substitute for horse manure in mushroom growing. *Ornamentals:* A method of producing chrysanthemum flowers continuously throughout the year has been developed in Hawaii. In Ohio application of gypsum to the soil was found greatly to reduce the loss of greenhouse carnations due to bacterial wilt. *Diseases and pests:* At several stations Phygon-XL was found to be an excellent protectant against apple scab. Virus diseases of stone fruits continued to be studied. The California station concluded that stem-pitting disease of grapefruit in

South Africa, lime disease in the Gold Coast, tristeza disease in S. America and quick decline in California are caused by the same or by closely related viruses. Mist concentrate sprays, using air as a substitute for most of the water formerly used, were found profitable on fruit. The control of ants on oranges resulted in protection of parasites of orange pests and hence increased the number and size of oranges produced in California. Insecticides on tobacco and some vegetables were studied.

4562. WELLESBOURNE.
2nd Annual Report of the National Vegetable Research Station, Wellesbourne, Warwick, Oct. 1950-Sept. 1951, 1952, pp. 83.

The Director briefly reports on progress in organization and development and outlines the research programme, more fully dealt with under separate headings, which includes the following projects: setting up of a crop weather station; selection work in winter cauliflower and other brassicas and onions; cabbage root fly control; physiological studies of growth and flowering of cauliflower; manurial trials with 5 vegetables; and fungal infection of watercress roots. [See also separate abstracts in section on Vegetables.]

4563. WEST AFRICAN CACAO RESEARCH INSTITUTE (W.A.C.R.I.).
Annual Report West African Cacao Research Institute, Tafo, 1949-50, 1951, pp. 84, 5s.

Virus research: Two new viruses have been noted during the year. The first produces no leaf symptoms and is identified by the swelling of the twigs, chupons and roots, while the second produces leaf symptoms only. Results of field experiments and demonstrations with cacao viruses are detailed. In studying the virus IA complex new qualities were discovered which strengthen the argument against artificial immunization. Cacao of upper Amazon origin was again found to be comparatively more resistant and also more tolerant to infection than was West African Amelonado, though this is not considered of practical significance. Investigations on alternative host plants of cacao viruses continued. The more important results of the final analysis of data from the mealybug experiments, to be published in detail separately, are: (1) Mealy-bug density is closely correlated with the density of the protective ants of the genus *Crematogaster*. (2) No direct correlation is apparent between mealybug density and incidence of swollen shoot, though populations in devastated areas are generally lower than in areas in which the virus is actively spreading. (3) It has been established that rainfall has little, if any, effect, on *Pseudococcus njalensis* density. *Capsid research:* In field trials a 0·3% Gammexane emulsion gave the best capsid control. Spraying and dusting machinery used in capsid control are discussed. *Botanical and horticultural studies:* Semi-hardwood cuttings were found more suitable for propagation than hardwood cuttings, and palm fibre and sand appeared to be the best rooting medium. *Mycology:* Results of pod rot control trials confirmed the value of weekly harvesting. The possibility of using fungi to control mealybugs is being investigated. *Mealybug studies:* Releases were made of parasites and predators and results obtained in mealybug control with the two systemic insecticides, bis (bis dimethylamino) phosphonous anhydride and bis(dimethylamino) fluoro phosphine oxide, are given.

Noted.

4564.

a MARCHIONATTO, J. B.
Enfermedades de la plantas florales. (**The diseases of flowering plants.**)
Librería del Colegio, Buenos Aires, 1950, pp. 135, illus., reviewed in *Rev. Agron. B. Aires*, 1951, **13**: 128-9.
For nurserymen and gardeners on the diseases of some 50 common garden plants.

b ANNUAL REVIEW OF BIOCHEMISTRY. (GRIFFIN, A. C., editor.)
Cumulative index, volumes 11-20.
Annual Reviews, Inc., Stanford, Calif., 1952, pp. 377, $6.00.
Author index pp. 1-203; subject index pp. 205-377.

c AUSTRALIA.
Twenty-seventh Annual Report of the Commonwealth Dried Fruit Control Board for year 1950-51, Melbourne, 1951, pp. 19.
Currants, sultanas and lexias.

d CANADA DEPARTMENT OF AGRICULTURE.
Annual Report of the Forest Insect and Disease Survey, Division of Forest Biology, Science Service, 1951, 1952, pp. 154.
Including insects and fungi found on horticultural plants.

e CEYLON. (RHIND, D.)
Administration Report of the Director of Agriculture for 1948, Part IV—Education, Science, and Art (D), 1950 pp. 182, Rs. 3.65 [received 1952].

f CEYLON. (RHIND, D.)
Administration Report of the Director of Agriculture for 1949, Part IV—Education, Science, and Art (C), 1951, pp. 160, Rs. 3.20.
For abstract of report for 1950 see 4525.

g *The Edinburgh and East of Scotland College of Agriculture, 1901-1951*, pp. 59, illus.